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PROPRIETORS: WALTER KING, LIMITED. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

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An Extraordinary Year—A Policy Programme for the Gas Industry.

WITHIN a few hours of the close of the year, we glance over its remarkable events with feelings of thankfulness that they are over, though the bill of costs has yet to be footed by the nation. Those things have happened which were least contemplated. When the year commenced, we attempted to visualize the probabilities; but our imagination fell far short of what has actually occurred. It has been a year in which men of destructive and revolutionary ambitions have had their full fling, and have been routed. It has been a year in which an unprecedented chaos has ruled in our national industrial world; but we have issued from it with the prospect that its lessons will be the best assurance we could have of a better understanding in, and of a more peaceful life for, industry. Also that there will now be a curbing of those passions and desires which have been running riot in the world of labour, through the indifference there has been to the pernicious penetration of trade union policy by the tenets of men who believe the course to a better state of things is by subversive tactics and discord rather than by disciplinary, constitutional, and constructive procedure. We believe there will now be, or rather there would be if those entitled to authority in the labour world do their right part, a reconstruction of labour policy; for that policy has been drifting in directions which are out of joint with the developments of the times, and with common sense.

The matters that have been under the consideration of our readers during the year have been so many that we propose to confine ourselves to those which have altered temporarily, though expensively, the course of the gas industry's affairs, or which are expected to have an influence in the future. In other words, this is not intended to be a complete review of the industry's history in the year now expiring.

COAL COMMISSION'S REPORT.

When the year opened, we were in the middle of the period during which the Government were subsidizing the coal industry, in order to allow of an investigation to be made into its affairs by the Royal Commission, presided over by Sir Herbert Samuel, in the hope that their findings would appeal to the parties concerned, and that they would unite in a great endeavour to place the industry again on a sound economic foundation. Even before the report of the Commission was issued, the Prime Minister, his colleagues, and patriotic men in the labour world were working hard to find a peaceful solution to the difficulties between the colliery owners and the miners. His Majesty, in opening the new session of Parliament in February, made an appeal to them to face the future in a spirit of conciliation and fellowship, and to avoid action which would retard the return of good trade and prosperity to the country. In his preface to that appeal, His Majesty remarked: "The interests of the nation are paramount." Those words have, for the labour world, a greater significance now than they had then. To-day we can say the nation have proved that their interests are paramount, and have defended them successfully through the perils created by revolutionary firebrands. It has been suggested that the many millions of subsidy was a waste, and the inquiry by the Royal Commission futile. We are not so sure that that is the case. What we feel fairly confident of is that the revelations of the report had a large effect upon the course of events during the prolonged coal stoppage. Had it not been for the report, the trade union world might have done more than it did in support of the attitude of the folly-ridden Executive of the Miners' Federation.

The report of the Commission was a masterly and far-reaching document. It recognized something which was fundamental—that peace within the industry depended upon an improvement of its economic conditions, which had fallen to a parlous level; that this was the work on which there should be concentration. It was that basic problem which the Miners' Federation refused to concentrate upon, and even to recognize—their policy being circumscribed by the now famous slogan: "Not a penny "off the pay; not a minute on the day." Yet the Commission told them and all concerned that hours and wages did not, in the then existing state of things, constitute the cardinal matters; they were rather a phase of the very big problem which had to be tackled and solved. The report was a bulky volume—constituted of considerations affecting the position, and of constructive recommendation, all parts of which, however, did not appeal to either the miners or the owners. Among other recommendations was the appointment of a National Fuel and Power Committee whose functions, it was suggested, should be of an advisory order. This Committee was appointed in August, with the Rt. Hon. Sir Alfred Mond as Chairman. The membership is representative; the thirteen members including Mr. D. Milne Watson, D.L., LL.B., and Sir Arthur Duckham, K.C.B. The terms of the appointment state that the Committee are to consider and advise upon questions connected with the economic use of fuels and their conversion into various forms of energy, having regard to national and industrial requirements, and in the light of technical developments. This is a little digression arising out of the report of the Commission. It is impossible to mention the nature of the whole of its contents; but a summary will be found in the "JOURNAL" for March 17 and 24.

THE OWNERS' POSITION.

An important point to remember in connection with the dénouement of what was nothing more or less than a plot on the part of the Miners' Federation, led by "the humble disciple of Lenin," is this: Immediately after the issue of the report of the Commission, the Mining Association published a pronouncement of policy, in which they stated that they considered a longer working day was imperative to prosperity; also that negotiations should be on a purely district basis, and not a national one, but that they had no objection to general principles being applied to each district. Be it remembered the owners and the country had had five years' experience of a national agreement; and under it had suffered the three months' national strike of 1921. Also under the national agreement we have had the seven months' stop-

page this year. The owners were right in their attitude for district agreements, also in their claim for a longer working day to re-establish the economic conditions of the industry. All who tried to interfere with the owners' basic conditions, we firmly believe, were wrong; and the owners (despite their heavy losses) did the country good service in standing out as they did, notwithstanding the mistaken pressure of the Government and other well-meaning, but in this matter incompetent, people. The Miners' Federation promulgated their opposition to any wage reduction or lengthening of shift hours, for the former of which there was no need, granted an extension of hours and an increased production per man-shift. They also resisted district settlements, and naturally, because they knew the passing from national to district agreements would reduce the power of the Federation—a condition for which their own foolhordy policy has provided the justification.

At this time, in April, the Executive were taking up an uncompromising attitude, and making preparations for a strike by enlisting the support of the General Council of the Trade Union Congress, by trying to obtain an undertaking from the International Miners' Federation to stop the export of coal to this country, and (as events showed) promises of huge sums of money from Soviet Russia, who evinced a ready willingness to subsidize a strike in this country. The Miners' Federation, despite the subsidy of our Government to the industry, and the report of the Coal Commissioners, pursued a headlong course to disaster, always ready with an answer in the negative to proposals, never making a suggestion upon which negotiations would have been possible. The days were critical, full of conferences and discussions, but always ending in a fresh *cul de sac*. Outside industries and coal retailers were doing their utmost to get possession of every pound of coal upon which they could lay hands.

The General Strike.

The momentous day (April 30) arrived, by which time the subsidizing of the mining industry by the Government amounted to the enormous sum of £23,264,197. The men throughout the mining industry were instructed to leave work; and the Federation commenced forthwith a course of deception which no doubt they, in their simplicity, thought to be good strategy or fine cunning. They fooled the men throughout; they designated the strike a "lock-out." The next day the General Council of the Trade Union Congress called (and hastily regretted their action) a general strike of all men engaged in transport, printing, the iron and steel trades, heavy chemical groups, and building trades; and instructed the unions connected with the supply of gas and electricity to co-operate with the object of ceasing to supply power.

This was a challenge to the State, the Constitution, and the nation. The Government and the nation rose to the occasion. The stoppage of such transport as was controlled by the members of the Railway and Transport Unions naturally led to considerable dislocation throughout the country; but the Unions had obviously not reckoned that the private ownership of cars, and the skill of men other than their members to act as drivers would, within a short space, modify the disruption of ordinary services, which, it was supposed, would be in the interests of the miners. The nation showed a wonderful adaptability, and that quickly through private enterprise, the transport organization provided by the Government, and the assistance rendered by voluntary service to the railway companies. The newspaper world were also able to bring out abridged editions to inform the public of what was going on. No sooner was the general strike called, and the effects witnessed, than many of the responsible trade union leaders saw the folly of their own doing. As a matter of fact, the strike was ordered against the earnest counsel of some of the leaders, who, unfortunately, had to bow to the will of the majority.

So far as the supply of gas and electricity was concerned, there was comparatively little interruption. In some cases, where the electricity undertakings were controlled by councils having in their composition a majority of Labour-Socialists, either the supply was discontinued, or the service cut-off from certain industrial establishments. In the case of the gas industry, there was marked loyalty throughout, excepting where small sections of men left their work; and some of them to-day are sorry they did so. But this work was not of a nature which interfered with the supply of gas, save in one or two small instances. Immediately the strike took place, the Government set to work with the machinery they had created for meeting such emergencies. Directions were issued by the Board of Trade relating to the use of fuel, rationing supplies, and restricting consumption. Fortunately for the community, the gas industry had prepared itself with large stocks of coal—in some cases to the extent of the requirements for at least four months, and few undertakings had less than three months' supply. The great service which was rendered to the country by the gas industry throughout the general strike and coal stoppage is a record over which there is pardonable pride; and in this service the loyalty of the gas workers deserves hearty acknowledgment.

End of the General Strike.

The general strike ended on May 12. It was unconditionally withdrawn by the General Council of the Trade Union Congress. They were wise in bringing to a close an untenable position, and one which, had they not withdrawn, would have led them into trouble whence it would have been very difficult to extricate themselves. What they had done was unscrupulous, unpatriotic, unconstitutional, and illegal. They had been led by a spirit of faction which had only political and party ends in view. What they had attempted to subvert issued from the strike stronger than before; while the trade union institutions were considerably weakened. There were no doubt several unadmitted reasons for calling-off the strike. Sir John Simon had told the House of Commons that the leaders of the Unions who were responsible for it, and the men who had broken their contracts of service with their employers, were subject to actions for damages for any loss that had been incurred. Mr. Justice Astbury, in the Chancery Division—on a motion by the National Sailors' and Firemen's Union for an injunction against Secretaries and other officials of certain branches, to restrain them from calling upon their members to strike or leave their employment without the authority of the Executive—stated that the strike was illegal and contrary to law. He said much else which showed that the members of the General Council of the "T.U.C." had thrown themselves open to damages which, had there not been restraint on the part of employers, would have utterly ruined the participating trade unions.

Many of the trade union leaders have admitted the folly into which they permitted themselves to be led, or to take part. The calling of the strike was really the greatest disaster that has ever befallen the labour organizations of the country. It is acknowledged that since the culpable act thousands of men have been unable to recover their employment, many have been employed for short time, and the unions themselves have become practically bankrupt; and many, indeed, are burdened by enormous debts. While the general strike was on, there was a sullen resentment on the part of a large section of trade unionists who had been called from employment; and, had the strike not been called-off when it was, the leaders would have had the mortification of seeing large bodies of men returning to work, without their sanction. Many, in fact, were thoroughly ashamed of their leaders. Most of the trade unions signed terms of settlement which admitted that, in calling the strike, they committed a wrongful act against the employers. Certain it is that under the new agreements into which they have entered, there is little fear that there will be a repetition of this sort of thing. In fact, after the test to which the trade unions and the miners have put the country this year, they ought to be prouder of it than ever before.

Soon after the general strike was over, the Chancellor of the Exchequer stated that he did not think the direct expenditure by the Government on its account would necessitate the imposition of additional burdens on the taxpayers. He believed that the Government's net direct

expenditure would not exceed £750,000. This, however, has nothing to do with the coal stoppage, and its disastrous effects on the finances of the country.

REVISION OF TRADE UNION LAWS.

Owing to the general strike, a strong appeal has been made from the country for a revision of the trade union laws. At present, under the Trades Disputes Act, the unions are privileged in a manner which has been shown to be inimical to the interests of the nation. A Committee of Ministers have been exploring these matters; and the Government have now on the stocks a Bill which it is proposed to introduce early in the New Year. It has for its object the amendment of the trade union laws, and in directions which will be, in the first place, a defence to the nation, and, in the second place, a protection for those workers who desire to have their individual liberty, to confine the functions of trade unions to their legitimate industrial purposes, and to debar them from being used for political purposes which may not be in accord with the general views of the members.

THE COAL STOPPAGE.

In the foregoing paragraphs, we have lightly sketched the events which preceded the coal stoppage, and which show conclusively that the Executive of the Miners' Federation had no intention of having regard to facts, and of averting the calling of the strike by negotiating along lines which would be of mutual benefit to their men and the industry which gives them employment. We have also seen that the owners, before the strike occurred, laid their cards on the table, which presented the fundamentals on which they were prepared to negotiate, and which are in the main the ones on which agreements were founded at the close of the stoppage. As a matter of fact, the miners in the different areas could have secured terms last April superior to those which the industry could afford after seven months' loss of work and trading; they could have obtained even four months ago better terms than those upon which they have returned to work. But attempts at agreement were time and again shattered by the incompetence and obstinacy which ruled at headquarters. It would be futile here to go over all that took place between the end of the general strike and the close of November. The seven months' history is made up of abortive conferences on the part of the Government, the colliery owners, and the Miners' Federation, with other organizations occasionally intervening, with no good result. Time after time the Government submitted proposals, which, as regularly as they were made, were turned down by the Miners' Federation, or by the men themselves, on the recommendation of their representatives. On one or two occasions, certain recommendations were put before the men—such as those proposed by representatives of the Churches—and they rejected them, because they were not in harmony with the programme on which they had been called out. They were also of a character which the Miners' Federation knew full well could not be accepted by the colliery owners if they desired the industry to regain an economic state, and to have a period of peacefulness. Notorious throughout these times were the weekly ravings of the Secretary of the Federation, Mr. Cook.

FINANCIAL PRESSURE.

However, as the weeks passed, the leaders of the Federation began to see the handwriting on the wall. They found that the other trade unions were unprepared to support them financially. They attempted to obtain an embargo on the importation of coal; but the transport unions declined. They threatened that they would withdraw the safety men; but fortunately the safety men were under the control of other unions, the leaders of which refused to lend themselves to a mad policy of destruction, which would have made the position of the miners still worse. One cannot look over all the events of this period, and the wearying results of good effort, without coming to the conclusion that this was a big attempt on the part of certain members of the Miners' Federation to use that organization for a political end. In passing, it is interesting to note that the greatest financial support the Miners' Federation secured was from Soviet Russia. In the House of Commons on Dec. 6, it was stated that, up to the beginning of December, the amount received by the Miners' Federation from Russia was £1,150,000; and a further remittance of about £40,000 had been sent within the previous two days. This sum appears to be a large one; but, as a matter of fact, it is very small when one considers that about a million workers were idle in the coal industry, and that the dispute continued seven months. Naturally, in the circumstances, the strike pay soon diminished; and for the maintenance of the miners' dependants, poor law authorities had to make large borrowings. In addition, benevolent persons did much for the support of the families of the men on strike; but despite all this, attempts were made to create antipathy in other countries to this one for (so the scandalous report went) allowing the women and children of the miners to starve. The lie was quickly nailed to the counter. The big outgoings and the relatively small income of the Miners' Federation was another difficulty with which they had to contend. One cannot have a million men on strike without incurring large obligations.

THE BURST OF THE DAM.

Still another trouble was that, as early as June, in the Nottinghamshire and Warwickshire districts, several hundred men returned to work; and the dam having once been broken, the stream increased rapidly in dimensions in those areas. By the third week in June, over 30,000 men were at work in the country, chiefly in Warwickshire, Notts., Derbyshire, Staffs., and Kent; and, although there was partial success in stemming the tide, those who had returned, with few exceptions, continued at work. By the middle of September, we were able to report that some 55,000 men were at work—true, a small number compared with those who left the mines at the end of April. But still they were helpful with production to add to the imported coal from the Continent. So the return continued to increase in volume until, before the strike officially ended, there were nearly half the men at work who had come out on strike. As the flow back continued, it was obvious that the end was in sight, and that the Miners' Federation could not hold out much longer, notwithstanding the finesse which they were constantly displaying.

As a last resort, the members of the Executive formed themselves into a "Council of War," and perambulated the coal areas, indulging in much speech-making which had little or no effect, except to cause the country to smile at their stupidity. It was obvious from all that transpired in these latter weeks that the General Council of the Trade Union Congress and the leaders of other unions were thoroughly sick of the miners' hair-brained leaders and firebrands. November saw the Federation Executive at the end of their tether; and in the "JOURNAL" for Nov. 24, we were able to report that "full steam ahead" was the state of affairs in some collieries, while in others there was an indication of a return to life. Bungling and incompetence on the part of the leaders of the Federation had brought about the end which could have been reached without a stoppage of any sort—without the enormous loss to the country, its industries, and its workpeople, and without the losses and privations which the miners and their families suffered.

In passing, it may be mentioned that it was shown by Dr. Bowie, at the meeting of the British Association, that the miners had lost in wages through industrial disputes since the formation of the Federation sufficient to have enabled them to buy up, lock, stock, and barrel, the whole of the collieries of the country; and the community had lost, through the policy of the Federation, at least four times the present-day capital value of the collieries. Our contemporary, the "Iron and Coal Trades Review," calculated that in the first six months of the stoppage, the loss of wages amounted to about £70,000,000, and that the colliery owners had in the same period expended something like £12,000,000 in the upkeep of the collieries.

The End, and the New Agreements.

The Federation at the end of November saw there was nothing else to do but to accept the conditions which had been laid down by the colliery owners for the making of district agreements; and on Dec. 4 it was decided that those men who had not returned to work should do so—their local organizations making the best agreements possible. The first week in December was a busy one, for the district organizations and the mine owners, in settling the terms of the regional agreements. A curious commentary on the slogan which was emblazoned on the banner of the Federation at the beginning of the stoppage is found in the fact that the officials of the miners' associations in the various districts put their signatures to agreements in which the hours of work are eight or seven-and-a-half per shift; and the agreements are operative for periods varying between two and five years. Even in the Yorkshire District, the Federation President (Mr. Herbert Smith) agreed to a settlement on a seven-and-a-half hours' basis. By the end of the first week in December, 800,000 men were once more at work. It is calculated that some 200,000 of those who left their work seven months previously cannot at present find employment, owing to the great injury that has been done to the coal industry through the loss of trade, and through the return of the industry to more economic conditions—without any degradation of the pay of the men, but with their contribution (which they appear happy to give) to the rehabilitation of the industry.

It has been computed that the cost of the stoppage to the country will be somewhere in the neighbourhood of £500,000,000 sterling—and this the work of the incompetents and wreckers at the head of the Miners' Federation.

With the termination of the strike, the regulations affecting the home sale of coal and coke speedily came to an end; coal exports were next freed; and by Dec. 12 the Government were able to withdraw their prohibition of exports of anthracite and coke, which brought once again complete freedom in the transaction of business to the coal and carbonizing industries.

Imported Coal.

Reverting briefly to this subject, the policy of the Miners' Federation benefited enormously the coal industries and miners of other countries. They have profited where our coal industry and miners have lost grievously. By the third week in June, coal from abroad had commenced to make itself felt; and even from America, it was soon being delivered in the Thames at a cost of 35s. per ton, which price, however, through advancing freights and the increased demand for the American product, rose rapidly, until at one time it was stated that in London approximately £5 per ton represented the peak cost of the coal delivered. For gas and coke making, the American varieties were found to be superior to the coals which were being delivered from the Continent. By July, coal was reaching this country from Germany, Belgium, Poland, France, Sweden, U.S.A., and Canada, and then at the rate of about 600,000 tons a week. It found an eager market; and the imports continued to rise rapidly. The following table shows the record of imports from May to November:

—	Tons.	Value
		£
May	3,618	5,983
June	600,634	966,290
July	2,319,657	4,147,995
August	3,970,442	7,542,847
September	3,940,880	7,749,101
October	3,489,083	7,722,940
November	3,467,921	9,037,254

The official figures for imported coal are, to the end of November, 17,794,701 tons, and the value £37,177,033. It was calculated by Col. Lane-Fox, Secretary of Mines, early in December that the total quantity of foreign coal delivered to Dec. 4 was 19,500,000 tons; but it must not be forgotten that coal is still arriving under contracts which were made by gas undertakings, among others, for protective purposes. In the House of Commons on Dec. 2, it was stated that the Government had purchased during the stoppage 2,500,000 tons of foreign coal; and at that date all this had been exhausted with the exception of 10,000 tons. Another interesting item was supplied by Col. Lane-Fox regarding the amount of coal received from Germany during the stoppage. Up to the end of November, it was 6,522,322 tons, the average c.i.f. value being £2 1s. 8d. per ton. The Government bought 56,000 tons of German coal at an average price of 30s. f.o.b., and from Upper Silesia 600,000 tons, at an average of 33s. 6d. f.o.b. An indication of the effect upon the American coal industry through the coal stoppage in this country, is that, during the nine months ending with September, the export of bituminous coal from the States exceeded 18,400,000—well over 50 p.ct. in excess of that in the corresponding period of 1925. We have not the figures available for October and November; but they must have been considerably greater than those of any of the preceding months.

The Position of Gas Undertakings during the Strike.

As already indicated, most of the gas undertakings in the country commenced this unprecedented strike experience with three or four months' supply of coal in stock. Their precaution in this regard was founded on the experience of 1921; but no one had any idea that a strike of this nature could have been prolonged to seven months. Nevertheless, throughout that period a service of inestimable value was rendered to the country by the gas industry, and yet that service is probably unrecognized by the majority of people. Had it not been for the eight million or so gas cookers in the country, together with gas-fires and other gas-heated apparatus for domestic and industrial purposes—had it not been for the high thermal efficiency of the gas-works process, whereby not only gas as a fuel but coke was made available to the extent of several million tons for the use of the people, the country could not have sustained in the manner that it did the pressure for fuel which this long stoppage occasioned. But as our readers know, though the public generally are not aware of it, this placing into stock of such enormous quantities of coal caused an outlay both in provision and in handling which enhanced the cost of gas production. The stocks of coal were gradually reduced, until, by September, gas undertakings were feeling the pinch in obtaining raw material promptly and adequately. Naturally, water-gas plants had been brought into operation to their full capacity, so as to enable the available coal to be eked-out to the utmost extent. Even the ordinances of the responsible Government Department as to a reduction of consumption, and the appeals of gas undertakings to their customers to consume economically, had comparatively little effect. In industrial districts where industries, through want of coal, had partially or wholly to close down, there was some reduction of gas consumption; and probably many undertakings will end the year showing not an increase but a reduction of output. In other cases, however, the domestic consumption increased; and, in some instances of which we have heard, a good percentage increase of sales is certain to figure in the forthcoming accounts.

Immediately the importation of coal commenced, there was pressure on the agents to supply gas undertakings; and those fortunate concerns that had vessels of their own reaped a great advantage by being their own fetchers and carriers between Continental ports and this country, as well as facilitating transport by sending their boats to southern ports, and there receiving direct from the ships that had crossed the Atlantic supplies of American coals. Not knowing when the strike would end, many of the large undertakings had to enter into contracts for foreign coal well ahead, in order to protect the continuity of gas supply; and these contracts are at prices which must exert an influence upon the price of gas for a period well into the New Year. Such arrangements were made in the interests of the public; but the public have little knowledge of such matters. Consequently, immediately the coal stoppage in this country came to an end, certain

newspapers adopted the price of gas as a useful stunt for trying to create popular prejudice in the matter. But we are certain the outcry made by these papers is not representative of a general feeling among the populace. Had it not been for the excellent prices obtained for secondary products other than sulphate of ammonia, the price of gas would have gone to heights which would have astonished the people, and would have been a burden upon them in a time when they least desired anything of the kind to occur. The experiences of the Gas Light and Coke Company in the purchase of foreign coal, and the expenditure incurred above normal, illustrate well the remarkable steps taken by the industry to keep the supply of gas unaffected. A report of a speech by the Governor (Mr. D. Milne Watson) published in the "JOURNAL" last week [p. 763] adds a valuable chapter to the year's history.

It should be acknowledged that immediately British coal was again available, though in comparatively small quantities, the National Gas Council got in contact with the Mines Department, and urged the necessity for assisting the gas industry to obtain supplies, in order universally to maintain the distribution of gas. Not only did the suppliers of foreign coal benefit considerably from the needs of gas undertakings, but the importers of gas oil for carburetting water gas also found a lucrative business. The price went up to 6½d. per gallon, net and naked, *ex* wharf. During the eleven months ending November, the quantity of gas oil received from abroad amounted to 105,690,150 gallons; this being an excess of 40,361,106 gallons over the deliveries for the corresponding period of 1925.

COKE-OVEN GAS AND COAL STOPPAGES.

An important point in connection with the supply of gas has been raised. Several towns now purchase gas from coke-oven plants; and the strike has emphasized how, with a coal stoppage, this business connection suddenly terminates, and so makes imperative the maintenance by the buyers of the gas of adequate stand-by plants to meet emergencies such as that of this year. Middlesbrough is an outstanding example of a town which had been relying solely upon a coke-oven supply; but Mr. Charles F. Blincoe, the Engineer and Manager of the Corporation Gas-Works, met the position with such foresight and promptitude that there was no cessation of supply in the area under his charge. Mr. Ralph Halkett, the General Manager and Secretary of the Sheffield Gas Company, who are considerable buyers of coke-oven gas, made reference to the position in an address which he delivered to the Yorkshire Junior Gas Association. He submitted that, if coke-oven gas is to be a commercial proposition for town gas supply, it is necessary that collieries should have power from the Government, whereby they will be able during industrial disputes to work their coke-oven plants, and so maintain the supply of gas.

COAL RESEARCH, AND THE NATIONAL COAL AND POWER COMMITTEE.

There would be little value in attempting in any way to reflect the prices which have had to be paid for coal during this extraordinary year. But there are other matters which may be briefly mentioned as having had prominence in technical and commercial circles. More work than ever before is being done in the examination of coal for various purposes. We have seen this in the articles contributed to our columns by Dr. Geoffrey Weyman and Mr. S. Qvarfort, of Stockholm, by the International Conference held in Pittsburg, and by reviews of the work carried on in other countries in the same direction. In various colliery districts, research work is being conducted; and at the Birmingham University a coal research laboratory was formally opened as recently as November—the equipment including a pulverized fuel plant. Particular emphasis, too, has again been laid on the necessity, in the interests of the country, for a greater cleansing of coal; and it is probable that—through the work of the National Coal and Power Committee (the appointment of which has already received notice in this review), and through the pressure which is being brought to bear upon the coal owners by the various industries of the country—developments will take place in this connection which will have considerable advantage in the reduction of incombustibles in coal. The London County Council in an Act secured a clause under which coal retailers can be brought to book for supplying coal containing an abnormal quantity of inert material.

COAL-SELLING ORGANIZATIONS.

This is a topic which may have considerable influence in the future. It was first raised in this country by Sir Alfred Mond, in letters to the Press during the period of the coal stoppage. He further dealt with it in his Presidential Address to the members of the Society of British Gas Industries; and he then gave an assurance that such coal-selling organizations would not lead to excessive prices. He added: "The consumer, particularly the industrial consumer—for instance, the gas industry—is more interested in seeing ahead for a number of years the course of prices of raw materials than in enjoying any small temporary advantage which may be secured by abnormal conditions." The Government appointed a Committee to inquire into the matter, and reports from this body were published early in December. The majority report contains the main conclusion that the development of organized marketing in the coal-mining industry is desirable to obviate excessive production, and to effect economies and improvements in the marketing of coal to help to stabilize the industry. The minority report urges that the system of free and open competition under which the coal trade in this country reached the commanding position it occupied in the markets of the world before the war, is that which is best suited to its development in future. We have now to await the steps the Government may propose to take in this connection. Already, however, two or three organizations of colliery interests have been formed for the express purpose of marketing their produce.

This is a matter the gas industry will have very closely to examine in the light of the experiences of the gas undertakings in Germany. In the last report of the Committee of the German Gas Association, reference was made to the continued refusal of the German Coal Syndicate to give guarantees of quality for coal. Described as worse even than this are recent attempts to classify coal from various pits, which the Syndicate consider of equal value, into price groups without regard to gas-making qualities; and the Syndicate claim the option to deliver any one coal of a group, instead of the particular brand stipulated by the gas-works. In the opinion of the Committee of the German Gas Association, far from improving the reliability of coke quality, this arrangement is a retrograde step, and must be sternly resisted. Thus it is seen that such organizations may be a not unmitigated blessing to buyers.

COKE.

Briefly scanning the work that has been occupying attention during the year in connection with secondary products, it is seen that much consideration has been given to the improvement of coke. This follows upon the Coke Competition, and the conferences which were held under the auspices of the Fuel Section of the Society of Chemical Industry, the Institution of Gas Engineers, and the Coke-Oven Managers' Association. Many workers have taken part in investigating the physical structure of coke, to provide it with better ignitable and combustible qualities. We may mention the work of the Research Department of the Woodall-Duckham Companies, that of Mr. M. Barash, of the Research Department of West's Gas Improvement Company, of Prof. R. V. Wheeler, of the Research Staff of the Joint Investigation Committee of the University of Leeds and the Institution of Gas Engineers, and of the Fuel Research Station. At the Sheffield University research is to be made into the subject of blast-furnace coke. A Northern Coke Research Committee has been formed with a centre at Armstrong College, Newcastle-upon-Tyne. These references only supply a bird's-eye view of the extensive character of the

work that is being prosecuted in this direction; and it may have a very important effect in the future on the character of coke produced by the gas industry, if it is to develop a greater popularity for the first of its secondary products.

During the coal strike, the great demand there was for coke, combined with the cost of the coal from which it was produced, caused the price to ascend considerably—to the advantage of gas consumers. Every ounce of coke that could be produced was required; and most gas-works had considerable queues waiting daily for participation in the available supplies. This being so, there was little cause for regret that prohibition was put upon the export of coke. Up to the end of April, the exports of coke amounted to 362,825 tons, of a value of £374,518. At the end of November these figures had only risen to 383,429 tons, and £395,517.

Tar.

Throughout the year tar has been receiving considerable prominence. At its beginning the Central Executive Board of the National Gas Council appointed an Advisory Committee for the purpose of considering the requirements in respect of the constitution and functions of the British Road Tar Association. This organization has been established, and is actively engaged watching over the interests of producers of tar in connection with its road utilization. Much interest has also been taken in the efforts to bring together road surveyors and tar producers through their respective organizations, with a view to revising the specification for road tar. This matter is engaging the attention of the National Gas Council; but there are signs that we are now approaching a stage when modifications will be made which, it is hoped, will be mutually approved by both the tar interests and those technically concerned in the making and maintenance of roadways. Bitumen, of course, still continues to be an active competitor; but much has been heard regarding the want of efficiency of this material during certain weather conditions which affects the safety of road users.

Another interesting feature of the year was the Coal Products Exhibition, which was held in Manchester in November. On that occasion, a Tar Conference was held, which was organized by the Fuel Section of the Society of Chemical Industry, the Institution of Gas Engineers, and the Coke-Oven Managers' Association. At the conference it was decided to form a representative Committee of the interests concerned, to consider the standardization, as far as possible, of the methods of testing tar and its constituents. The papers and discussions dealt largely with such matters as the difference between horizontal and vertical retort tars for road purposes. But it was made clear that tars effective for such use could be produced from either carbonizing system. This is important in view of the fact that probably nearly half the coal carbonized by the gas industry is now treated in continuous vertical retorts. There has also been complaint on the part of briquette makers that the pitch from vertical retort tar is not so good for their purposes as the horizontal product. Here, again, it is only a question of the proper manipulation of the pitch to secure those binding qualities which are required. A further subject which was discussed was the question of freeing the tar used for road purposes from the acid constituents which are deleterious to fish and plant life in our waterways. There is no difficulty about this. It is entirely a matter of the tar distillers extracting these acids, which have a commercial value. As in the case of coke, so in that of tar—we cannot usefully refer to the course of market prices during the year, in view of the abnormal conditions which have prevailed. But it is interesting to note that for the eleven months ended Nov. 30, the quantity of tar, oil, creosote, &c., exported amounted to 34,627,003 gallons, as compared with 36,764,288 gallons in the same period of 1925.

Sulphate of Ammonia.

Regarding sulphate of ammonia, the position is highly interesting, if disappointing, to bye-product producers; but they cannot say that they had no warning of the possibilities in connection with synthetic nitrogen. What was predicted has come to pass. As the Chairman of the British Sulphate of Ammonia Federation (Mr. D. Milne Watson) stated at the recent annual meeting, the synthetic article now supplies about 47 p.ct. of the world's demands, and bye-product nitrogen chiefly in the form of sulphate of ammonia accounts for only 27 p.ct., while Chilean nitrate has possession of the other 26 p.ct. Moreover, as Germany produces about 70 p.ct. of the world's output of the synthetic product, the German prices govern the market; and it is largely due to this that the British Federation have had to reduce their prices in order to put the home product in a competitive position with that of Germany. What has happened shows that the policy which the Federation have been pursuing during recent years has been abundantly justified. Now they are broadening the boundaries of their operations by founding what is known as Nitram Ltd. The new Company will undertake work for which the Federation have paved the way. The scheme will provide capital which the Federation lack, also adequate expenditure for propaganda and administration, but will limit contribution by bye-product members of the Federation to the maximum of 3s. per ton of production. It creates a selling organization which, it is believed, will in time profoundly affect the whole fertilizer position in this country, as the new Company will be in the position to sell any kind of fertilizer required by British farmers. In this way, it will invest the makers of bye-product sulphate of ammonia with a very important place in the conduct of fertilizer sales and propaganda, which, there is confidence, will be beneficial to both producers and consumers. On the invitation of the Federation and the Stickstoff-Syndicat (Berlin), a meeting took place in April at Biarritz, representatives being present from the different countries; and it is the view that considerable benefit will accrue not only from this conference but from future ones.

In articles and papers a considerable amount of attention has been devoted during the year to the subject of the physical condition of sulphate of ammonia; the matter having become one of pressing importance, in view of the fact that customers abroad have been complaining of the caked condition in which bye-product sulphate has been reaching them. The way of improvement has been pointed out by various workers.

There is evidence now that good will issue from the persistent work which Dr. T. Lewis Bailey has done for some time past in trying to promote a better condition of gas-works effluent, so as to avoid nuisances and complaints. The National Gas Council referred to the Institution of Gas Engineers the question of undertaking immediate research into the subject; and, for the purpose, the Institution have appointed a Committee, consisting of Prof. Smithells, Prof. Cobb, the late President of the Institution (Mr. C. F. Botley), and Mr. W. E. Price. The services of Dr. Parker and Dr. Monkhouse, of the Leeds University, are being utilized for the investigation; and Dr. Bailey has promised his assistance.

As to business abroad in sulphate of ammonia, it must be remembered that the coke-ovens of the country were non-productive for some months, and gas-producing conditions in gas-works, and the character of some of the coal used, also affected the available supply of the fertilizer. In addition, there is the stronger competition from the synthetic product. One result of the combination of circumstances is that the total exports for the eleven months to the end of November amounted to 156,762 tons, as compared with 238,609 tons in the corresponding period of 1925—a reduction of 81,847 tons. Spain and the Canaries only bought 37,636 tons, as against 109,504 tons in the corresponding period of 1925.

The latest prices for sulphate as notified by the General Manager of the Federation (Mr. F. C. O. Speyer) are, for neutral quality: November, £11 16s. per ton; December, £11 18s.; January, 1927, £12; February, £12 3s.; and March, April, and May £12 6s.

Questions of Policy for the Industry.

It has been seen from the foregoing that the events of this year of turmoil, struggle, and hard work, have made deep impressions upon the interests of the gas in-

dustry—some temporarily bad, but which will with time be overcome; some beneficial. The big rush there was for gas-consuming appliances, and the lessons the community had as to the reliability of the service of the gas industry in the worst possible emergency, will have a good effect upon its fortunes in the future. But we have to look forward, and trim our doings and powers to the experiences we have had, and to the new circumstances with which the industry is environed. We have from time to time in articles attempted to envisage these. Towards the end of last year and the beginning of this, we urged the consideration and formulation of a "looking-forward" policy; and the year has seen much work and advocacy in this direction. It has also been suggested in our editorial columns that investigation should be constantly made into other developments, to ascertain whether new branches of business cannot be added to those already possessed. This, it has seemed to us, is politic. Our coke markets have attracted low-temperature carbonization; we have to contest any inroads into our coke markets by seeing whether we cannot qualitatively do better than at present, by blending coal or in some other way, with coke produced at high temperatures. In this connection, we shall have to watch very closely the proceedings of the Fuel Section of the Society of Chemical Industry, and those of the new Institution of Fuel Technology. Tar is competing with bitumen for road purposes; and synthetic ammonia is now produced in quantity which gives it precedence. The competition in these various directions means that we may have to submit some part of our coal to complete gasification, or see whether developments of processes cannot take place, so that the gas industry can participate in such new business (when the time is opportune) as oil production from coal and the supply of pulverized coke to industrialists. As we have before pointed out, these are only suggestions; but they ought with other matters to be kept under special observation by the gas industry. They have been discussed on various occasions; and Mr. Harald Nielsen has submitted through our columns that the production of oil, having regard to the oil outlook, should help to the supply of a cheaper gas therm. A general review such as this prohibits our entering into detail, which must be sought in previous publication in the "JOURNAL."

There is the immediate question of a looking-forward policy. And looking ahead there are several things which demand our attention. The National Gas Council took up this matter and made investigation, with the result that, through the speeches of the President (Mr. D. Milne Watson) and official documents, we have had the excellent constructive outcome of their labours, and are anticipating at no distant date the promotion of legislation which will confer further powers on the industry. The aim of this will be to give greater financial stability and facilities for territorial expansion, to utilize the most economic works for gas production, and to impart greater elasticity in the matter of charges through (say) two-part tariffs. Greater liberty will also be sought in capital-raising; and it is agreed that it is necessary fully to restore the confidence of investors in, and market values of, gas capital which suffered such unjust depreciation, through the operation of the sliding-scale, during the war. The South Metropolitan Company gave a lead in this direction by the institution of a basic price and dividend; and the Gas Light and Coke Company have this year secured an amendment of the sliding-scale by introducing into it a minimum dividend. The Government electricity scheme (as now authorized in an Act of Parliament) is directed towards the universal cheapening of electricity. Whether it will have that effect or not has been sufficiently discussed during the year. We have to see the proof now that the Act has been passed to enable electricity generation to be concentrated, inefficient stations wiped off the earth, and distributing cables carried into all the nooks and crannies of the country. The gas industry sees the way of wiping-out inefficient works by the process of amalgamating them to works of higher economic status, or by supplying the smaller undertakings in bulk. Co-operation is growing stronger and stronger. The question of a permissive change of tariff for promoting consumption has been the subject of articles, papers, and correspondence in our columns. The matter has also been discussed by the Institution at their annual meeting and in other quarters. A memorandum, dealing with reasons for, and detailing, the powers that are necessary to enable the industry to develop its public service, has been published by the National Gas Council; and this has shown the nature of what will probably be incorporated in a Bill to be submitted to Parliament. No time could be more favourable than this for such a step to be taken.

Another matter of policy which has been kept very much to the front—particularly by the "B.C.G.A." and its Executive Chairman (Mr. F. W. Goodenough)—has been the question of inspection and maintenance of consumers' appliances. The experiences at Glasgow were related at the Institution meeting; and from there and other quarters—special mention may be made of the discussion (based on the practices of the Gas Light and Coke Company) at the annual meeting of the "B.C.G.A." at Newcastle—experiences have come which show that maintenance is a protector of existing, and a wonderful developer of new, business. A special conference on the subject is being organized for Feb. 16 next.

Over the new Electricity Act (which the gas industry did not oppose, but sought to amend), a considerable amount of discussion took place; and the views of the industry were well voiced by the Governor of the Gas Light and Coke Company (Mr. D. Milne Watson) and the President of the South Metropolitan Gas Company (Dr. Charles Carpenter) at the annual meetings of the proprietors. The attitude of the Electricity Commissioners towards proposals that electricity supply should be undertaken by gas companies, where an electricity system does not exist, was not lost sight of during the difficult progress of the measure. When the Bill was in Standing Committee, a clause was inserted which provides that, where the owners of a gas undertaking apply under the provisions of the appropriate Acts for a Special Order for electricity supply, and the Electricity Commissioners decide that they are unable or unwilling to make an Order, the Commissioners are to refer the matter to the Ministry of Transport; and thereafter the Minister may, if he thinks fit, make the Order. Any Order so issued will have effect as though made by the Commissioners and confirmed by Parliament.

Smoke abatement has also been very much to the fore during the year, partly owing to the parliamentary proceedings in connection with the passing of the Smoke Abatement Bill, in which the Government still fought shy of dealing in any effective way with the domestic chimney, while admitting that it was a bad contributor to the impurities of the atmosphere. There has been more public consideration of this problem—partly due to the activities of the Smoke Abatement League and those of the "B.C.G.A.," together with the technical consideration given to the production of a suitable domestic smokeless solid fuel. Wherein is another reason for developing a looking-ahead policy.

The policy of the industry in regard to education has also been much to the fore during the year. While there is no, or little, criticism of the general lines of the Institution Scheme, there is still a feeling in some quarters that it requires a little more elasticity embodied in it to make it comprehensive of students whatever may be their circumstances or geographical situation. There has been discussion of the question why more students are not available to justify the establishment of courses in a greater number of the technical educational colleges and schools of the country. The conclusion we have come to is that this is not due to any want of desire or willingness on the part of the juniors of the industry, so much as to the lack of encouragement and the provision of facilities for them to take advantage of such courses. The Advisory Committee to the scheme are, we learn from Mr. Walter Hole, the Organizing Secretary, making inquiries into the matter; and it has been decided that a conference of representatives of the junior organizations of the country shall be held on March 9 to consider this and other matters connected with the scheme. It is highly essential that everything should be done to make the scheme of genuine and maximum advantage to the industry. Properly qualified men are the chief requirement for the future.

IN CONCLUSION.

This is the end of the programme we set ourselves at the beginning of this glance backwards. A general sketch has been made of the extraordinary experiences of the year, and attention has been called to the work that is in hand, having for its objective the stabilization of the interests of the industry in financial and trading directions. We must leave the year's volumes of the "JOURNAL" to do the rest; for the subjects dealt with in them have been countless.

However, before closing the work of the year, we should like to say how well the organizations of the industry have performed their varied functions on its behalf during the momentous months beginning with May—particularly the National Gas Council, the Institution of Gas Engineers, the Gas Companies' Protection Association, the British Commercial Gas Association, and the Society of British Gas Industries, the last-named of which held their twenty-first anniversary under the presidency of Sir Alfred Mond, Bart., M.P. The work of them all has been good. Never has the need of their activities been felt to a greater extent than during this year; and in view of the developments that are before us, direction and help will be required as acutely in the future, though in circumstances of a more agreeable order than those experienced during recent months. The Institution had to postpone its annual meeting, which was held in the autumn under the presidency of Mr. C. F. Botley, M.Inst.C.E., when matters of supreme interest (some of which have been incidentally mentioned during this review) were under discussion. The new President is Mr. John Wilkinson, of Nottingham. The District Associations also postponed some of their usual fixtures or cancelled them owing to the need for gas engineers being present at their works as much as possible. The Junior Associations and the Gas Salesmen's Circles have maintained fully the high reputation which they have won for themselves. During the year, Their Majesties the King and Queen visited the Beckton Gas-Works; and the Duke and Duchess of York, the Edinburgh Gas-Works. The Duchess also opened one of the new showrooms of the Gas Light and Coke Company. These were imposing events in the year's contribution to the industry's history.

The New Year will open more favourably than any for some time past. It is believed that, after the events of this year, we shall have greater peace and stability in industry. In several directions, there are signs of industrial improvement, and more trustfulness is being seen on the part of our customers abroad, who are placing substantial contracts in this country. In the gas industry, though we are being challenged in every department of our operations, there is a healthy confidence that there will be great expansion in the future. But we have deliberately to protect, and to do our part in bringing about the enlargement of, our trading interests. To this (as the volumes of the "JOURNAL" this year show) those in the leading places of our political, technical, and commercial affairs are fully alive.

To All Our Readers
The Greatest Happiness and Prosperity in the Coming Year!

Work in the Coal Areas.

About a week ago it was estimated that there are now employed in the coal-fields approximately 886,500 workers, who produce between 4,000,000 and 4,500,000 tons of coal a week. The actual figure for the week ended Dec. 11 was 4,467,900 tons. The number of miners who left work at the beginning of the stoppage was 1,107,000; but it is feared that only about 900,000 will be required. These figures, however, must not be taken as definite, but merely as fairly well-founded estimates.

"N.U.G.W." and the Strike.

The National Union of General Workers is the one in which many gas workers are concerned. As the President (the Rt. Hon. J. R. Clynes) frankly acknowledges, the general strike and the coal stoppage have had a deplorable effect upon the funds of the organization. The Union, in the short period of the general strike, paid out £60,000; and since they have paid, during the whole period of the coal stoppage, pit top workers some £6000 a week. Roughly, the Union have had to distribute a quarter of a million sterling. Membership has also dropped heavily; and during the coal strike, 120,000 of the members have been unemployed. The effects of a coal strike on employment do not stop in the mining industry. These disclosures were made at a meeting at Doncaster recently. On the same occasion, Mr. Will Thorne, M.P., the General Secretary, declared: "We shall not have another general strike in my lifetime." It will, in his opinion, take the trade unions a very long time to recover from the position they are now in. Superannuation funds in some cases have been spent, and there are large overdrafts at the banks. While, added Mr. Thorne, trade unionists retain the weapon of withholding their labour, strikes should only take place as a last resort. In the whole of our industrial history, few strikes and lockouts have been absolutely successful in achieving their objects.

Coke-Oven Gas for Town Supply in Germany.

An editorial article in our columns last week, headed "A Warning from Germany," called attention to a notable communication from Herr Ernst Körting, which had appeared in the previous issue of the "JOURNAL." "The Observer" for last Sunday week contained a message from its Berlin correspondent which dealt with one of the subjects referred to by Herr Körting. It stated that the German heavy industry has always understood the art of influencing State help to pay for costly experiments which it submits will ultimately benefit the community. He then refers to the big scheme for piping the German coke-oven plants to collect the gas produced by them; but he detects in this undertaking definite risks which will only be made apparent through costly experiments. The correspondent reports that the mine owners are unanimous in their opinion that centralization of gas production at the pit head, and the distribution of the gas about the country, will enable consumers to be supplied at about one-half the present cost of town gas; but he states that, up to the present, there has been no mention of the cost of transmission through the big conduit pipes which will have to be laid, and therefore no exact calculation of the financial advantage to be gained is possible. The subsidy which the mine owners are asking from the Reich, or from the Prussian State, is 25 million marks, which they suggest should be regarded as expenditure for work in lieu of an unemployment dole. It is thought probable that, from pipes running from a central station at Waldenburg in the Silesian mining district, the first city to be supplied with the gas will be Breslau. To the same network of pipes, Görlitz and Kottbus may be connected.

Improving Employment.

Now at the close of the year, there are rays of sunshine in the industrial situation. Day by day information arrives regarding new plant contracts of a substantial order; and the employment exchanges report that, for the week ended the 13th inst., the total number of persons on their registers had been reduced to 1,410,700. This is 95,620 less than the previous week, but 283,254 more than a year ago. Looking at these figures, it will be remembered that the total now includes a number of persons in the coal-mining industry who have not been able to resume work, and in whose cases the trade dispute disqualification no longer applies. But it is exclusive of persons in the coal industry who, at the date of the return, remained disqualified for unemployment benefit under the trade dispute disqualification.

Miners and Relief.

There are some 200,000 miners who are unable to obtain work; and the miners' leaders appear to think that special consideration should be meted out to them by accepting them *en bloc*, without question, for the dole. The country did not ask the men to come out on strike; they did so on the instructions of the Miners' Federation. Most people will endorse the decision of the Government that each case for unemployment benefit must be dealt with on its merits through the existing

machinery. We see no hardship in this. Certainly, the miners are not entitled to privileges in this regard that are not conferred on other people. Workers in other industries who were deprived of employment through the action of the miners are subject to the ordinary procedure in seeking relief. What applies to them must apply to the miners.

Coal Exports.

With the issue of the Board of Trade Returns for November, we have practically come to the end of the strike period in the coalfields, although further effects on our exports of coal will certainly be seen in the returns for December, and probably for some period in the New Year. In November, the coal shipped amounted to only 5111 tons, the value of which was £5724. In this quantity, there was none classified as gas coal. The comparative figures for November, 1925, were 4,337,768 tons, of a value of £3,986,720; and in November, 1924, 4,758,800 tons, of a value of £5,178,129. Taking the eleven months of the year, the total exports of coal only amounted to 18,987,802 tons, of a value of £17,252,588. In the corresponding period of 1925, we exported 46,185,067 tons, of a value of £46,201,851; and in 1924, 56,483,748 tons, of a value of £66,507,781. Compared with 1925, the loss is £28,949,263; and with 1924, £49,255,193. There we have a remarkable measure of the direct loss in exports occasioned by the coal stoppage, to say nothing of the indirect losses which have occurred through the absence of adequate and reasonably priced fuel supplies for our industries. With the other varieties, gas coal has suffered severely. In the eleven months of the year, the total quantity of gas coal shipped was 2,491,787 tons, of a value of £2,032,988. The figures for the same period of 1925 were: 6,225,547 tons, of a value of £5,791,024; and for 1924, 7,761,371 tons, of a value of £8,851,893.

Coal Imports.

In November, we received in this country from foreign sources 3,468,000 tons of coal, valued at £9,037,000. The total imports for the seven months from May to November were 17,792,000 tons, valued at £37,172,000. The average value in November was nearly 8s. per ton more than in October; the respective figures being 44s. 3d. for October, and 52s. 1d. for November. The quantity of coke and briquettes imported in the seven months was 895,000 tons, which were valued at £2,040,000. In the seven months, 27,216,000 tons of coal business was lost abroad by our mining industry, and 1,746,000 tons of coke and briquettes. Our contemporary, the "Iron and Coal Trades Review," states that the average price of the coal imported in August was 38s. per ton, as against 35s. 9d. per ton in July; while in September the figure was 39s. 4d., in October 44s. 3½d., and in November 52s. 1 2-5d. The average price of the coal imported over the first eight months of the year was 36s. 10d. per ton, over the nine months 37s. 8⅛d. per ton, over the ten months 39s. 3 2-5d. per ton, and over the eleven months 41s. 9 2-5d. per ton.

Gas Coke Shipments.

For interest's sake, it may be recorded that last month 7 tons of gas coke were shipped, of a value of £25. In November, 1925, the quantity was 149,312 tons, of a value of £143,611; and in November, 1924, 63,515 tons, of a value of £108,911. In the eleven months, the total quantity of gas coke sent abroad was 383,429 tons, of a value of £395,517. These figures naturally compare badly with the business done in the two preceding years. In the eleven months of 1925, 719,417 tons were exported, of a value of £790,146; while in the same period of 1924, the quantity exported was 884,552 tons, of a value of £1,547,058.

Exports of Coal Tar Products.

The returns show that during November 479 gallons of benzole and toluole were exported, as compared with 1196 gallons in November, 1925. In the eleven months, 420,587 gallons were sent abroad, as against 146,345 gallons in 1925. Of naphtha, in November 4011 gallons were sent abroad, compared with 6544 gallons in November, 1925. In the eleven months 64,947 gallons were shipped, as against 54,462 gallons in the same period of 1925. Of tar, oil, creosote, &c., 402,173 gallons were exported in November, which is over 1,000,000 gallons less than in November, 1925. During the eleven months 34,627,003 gallons were despatched overseas, as compared with 36,764,288 gallons in the like period of 1925.

Sulphate of Ammonia Shipments.

The business abroad in sulphate of ammonia during November was only half that of November, 1925. The amount was 7494 tons, compared with 14,929 tons in November, 1925. In the eleven months, 156,762 tons have been exported as against 238,609 tons in the same period of 1925—a reduction of 81,847 tons. Spain and the Canaries have let us down to a remarkable extent. In the past eleven months to those quarters, there has been exported 37,636 tons, whereas in the same period of 1925, the quantity was 109,504 tons. Italy has served us better by taking rather more than 7000 tons additional; on the other hand, the demand from British West Indies has fallen off by about 4000 tons. The remaining items have close similarity.

Gas Oil Imports.

The coal stoppage has resulted in a large extra demand for gas oil. In November, the imports amounted to 14,463,370 gallons, compared with 8,787,131 gallons in November, 1925. In the eleven months of the year, 105,690,150 gallons have been received, as against 65,329,044 gallons in the corresponding period of 1925—an addition of 40,361,106 gallons.

FORTHCOMING ENGAGEMENTS.

[*Secretaries of Gas and Kindred Organizations are asked to assist in making this diary of events as complete and useful as possible by sending the earliest intimation of all meetings.*]

Jan. 5.—MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.—Visit to the works of Messrs. J. H. Robinson & Co. (Liverpool), Ltd., Liverpool.

Jan. 7.—INSTITUTION OF MECHANICAL ENGINEERS.—Informal meeting, to discuss "Developments in the Carbonization of Coal," to be introduced by Dr. C. H. Lander, 7 p.m.

Jan. 8.—WALES AND MONMOUTHSHIRE JUNIOR GAS ASSOCIATION.—Visit to the Crindau Works of the Newport (Mon.) Gas Company. Paper by Mr. C. B. Felton on "Dry Meters."

Jan. 11.—NATIONAL GAS COUNCIL.—Meeting.

Jan. 11.—FEDERATION OF GAS EMPLOYERS.—Meeting.

Jan. 15.—LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—Visit to the East Greenwich Works of the South Metropolitan Gas Company.

Jan. 15.—SCOTTISH JUNIOR GAS ASSOCIATION (WESTERN DISTRICT).—Meeting in the Royal Technical College, Glasgow. Paper by Mr. A. Kay, on "Gas-Fired Hot Water Systems."

Jan. 15.—YORKSHIRE JUNIOR GAS ASSOCIATION.—Meeting.

Jan. 20.—MIDLAND JUNIOR GAS ASSOCIATION.—Meeting. Paper by Mr. A. R. Myhill on "Notes on the Operation of Gas Producers."

Jan. 22.—SCOTTISH JUNIOR GAS ASSOCIATION (EASTERN DISTRICT).—Visit to Messrs. R. Laidlaw & Sons, Ltd., Edinburgh.

Jan. 26.—SCOTTISH JUNIOR GAS ASSOCIATION (WESTERN DISTRICT).—Visit to the "Glasgow News and Daily Record" Office.

Jan. 28.—LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—Meeting at the Westminster Technical Institute. Paper by Mr. A. Hugh Seabrook on "Gas-Works and the Production of Light, Heat, and Power."

Feb. 16.—INSTITUTION OF GAS ENGINEERS AND BRITISH COMMERCIAL GAS ASSOCIATION.—Joint Conference on "The Inspection and Maintenance of Consumers' Appliances," at the Institution of Mechanical Engineers, Storey's Gate, S.W.1.

March 9.—JUNIOR GAS ASSOCIATIONS.—Education Conference.

March 16.—BRITISH COMMERCIAL GAS ASSOCIATION.—Midlands District Conference at Smethwick.

INSTITUTION OF GAS ENGINEERS.

Jan. 10.—Emergency and Finance Committees.

Jan. 11.—Advisory Committee on Education.

Wills.—Alderman F. Templer Depree, J.P., Chairman of Messrs. Willey & Co., of Exeter, who died last October, aged 76, left estate of the gross value of £14,166.

Manchester and District Junior Gas Association.—On Wednesday, Jan. 5, the Association will visit the works of Messrs. J. H. Robinson & Co. (Liverpool), Ltd., manufacturers of gas meters and appliances, at Liverpool. Following the inspection, a paper will be read by Mr. D. Benson, B.Sc., entitled "Gas-Works Instruments."

PERSONAL.

Alderman WHITESIDE, one of the new Freemen for the Borough of Clitheroe, is Chairman of the Gas Committee, in whose work and in the management and development of the Corporation gas undertaking he has taken the deepest interest.

Mr. DAVID ROBERTSON, who lately retired from the managership of the Dunoon Gas Commissioners, was recently entertained by the Town Council and friends to a complimentary dinner. Provost Ferguson, who presided, said that for fifteen years Mr. Robertson had been Manager under the old Gas Company, and during the ownership of the Town Council for twenty-six years. The Provost handed to Mr. Robertson a silver tea service as a mark of the esteem in which he was held.

OBITUARY.

J. W. BROADHEAD.

It is our painful duty to record the death of Mr. J. W. Broadhead, the Managing Director of the firm of Robert Dempster & Sons, Ltd., of Rosemount Iron-Works, Elland, which occurred on Wednesday evening, Dec. 22.

Though born in Huddersfield, Mr. Broadhead's early education was in the German language, his father having removed to Austria. Returning to Huddersfield in his teens, he was for a few years engaged at the engineering works of Messrs. Holmes, afterwards (in 1884) entering the firm of Robert Dempster & Sons. In 1892 he was appointed General Manager of the Company, and a few years later became Managing Director.

His death is a great loss to the gas industry. His winning personality and engaging smile, coupled with many sterling qualities, endeared him to a very large circle of friends both within and without the industry. His unbounded energy and enterprising spirit, operating in numerous fields, rendered him a pioneer of many brilliant successes; one characteristic note of his success being his natural ability in selecting a capable staff, and his genius in retaining them—most of his officials having been with him from a quarter to one-third of a century. For the gas industry, he not only championed the spiral gasholder in its early days, but also inspired the first British projector stoking machinery, the first British intermittent vertical retort system, and the firm's well-known continuous vertical system. In fact, the remarkable development and remodelling of the works at Elland have more than kept pace with the phenomenal growth of the gas industry itself.

Outside the firm he was a Founder and Past Chairman of the "S.B.G.I." and present Chairman of Section 1. He was also a member of the Institution of Mechanical Engineers and of the Society of Engineers; and for a number of years he was a member of the Halifax Chamber of Commence, being a Vice-President. In more social capacities he was a Governor of Grace Ramsden's School and President of the Elland Nursing Association. During the war he was O.C. the West Riding R.A.S.C.—M.T. (V.), and was a promoter in the formation of two V.A.D. Hospitals at Elland.

Mr. Broadhead was a great Freemason, being a Past Master of the Savile Lodge, Elland; P.P.S.D. of the Province; a member of the Evening Star Lodge; a member of the Northern Star Lodge; Past Chairman of the Mark Charity Committee, and P.G.D. of England; also P.Z. of the Sincerity Chapter No. 61; Founder and P.Z. of the Evening Star Chapter; P.E. Preceptor; Past First Provincial Constable K.T.; a member of the 30th Degree, and P.G.D. in the Allied Degree; and his amazing interest extended to many other Lodges, &c.

He died in harness; and one of his last business actions, made virtually from his death-bed, was to send through the Technical Press the unique advertisement wishing the gas industry and its Institutions the compliments of this festive season.

The interment was in Elland Cemetery yesterday, Dec. 28, in the presence of a large assembly of gas engineers, his staff, and neighbours, met to pay their last sad tribute of respect. While we mourn our loss, our sympathy goes out to his sorrowing family.

The Mayor of Plymouth, Mr. J. C. Bradshaw (the Gas Engineer), and members of the staff of the Devonport Gas-Works, together with brother Freemasons and members of the National Association of Local Government Officers, were present at the funeral at Weston Mill Cemetery, Plymouth, on Thursday, Dec. 23, of Mr. G. W. M. LEBAILLY, formerly Chief Clerk at the Devonport Gas-Works of the Plymouth Corporation.

ELECTRICITY SUPPLY MEMORANDA.

OUR readers are well aware that "Meteor" of the "Electrical Times" never loses an opportunity of attacking the gas industry. His manner of doing this often includes exaggeration; and sometimes (as in the case before us) he is not averse to using even an ordinary newspaper as a stalking-horse. He appears to find unholy joy in utilizing any piece of clap-trap regarding gas which may appear in a daily paper on the look-out for "stunt" subjects. He could not let pass the foolish attempt of one morning paper to raise public indignation over the present price of gas—an attempt which was unsuccessful. The majority of the public have in this instance shown reasonableness and gratitude. The industry which has incurred such a large expenditure to keep the country going with fuel for seven months might have expected that, at any rate, the writer in a technical paper would have had the courtesy, or sufficient common sense, to keep himself clear of participating, even by reference, to a consequential temporary compulsory condition of that industry, and to refrain from innuendo which in the circumstances looks remarkably like spite. But we have learned not to expect from the writer in the "Electrical Times" unprejudiced treatment of any subject in which gas is concerned; and so we are not surprised on this occasion.

Temporary Gas Prices.

If "Meteor" will read the speech of the President of the National Gas Council (Mr. D. Milne Watson), which we reported last week, and see what one Gas Company alone (to say nothing of the others) has done for London during the seven months' coal stoppage, he will recognize how paltry in comparison are his own references to the subject. If he will consider how the gas industry stood between the attacks of reactionary and revolutionary forces and the fuel starvation of the country, it should make him feel thoroughly ashamed for not recognizing such service, instead of helping to emphasize the endeavour of a morning paper unjustifiably to incite the public. Of course, the electricity industry has been perfectly good in its charges. That industry does not require the quantity of coal that is needed by the gas industry. The electricity industry has only put up its price 10 or 12½ p.ct.; in an instance quoted the price of gas has been raised 23 p.ct. There are cases where, through totally different conditions existing, the price of gas has not been raised. Bringing coal from all parts of the earth for the protection of the country has caused the gas industry to pay prices 100, 200, and 300 p.ct. above those ruling before the stoppage; the British collieries are not yet able to supply gas undertakings with all the gas coal they require at this period of the year; and there are still contracts for foreign coal running which had to be entered into two or three months ago in order to ensure no stoppage of the gas supply at the festive season and in the New Year. "Meteor" also states that the Press and the public are commenting on the fact that "many" gas concerns have been obtaining more than £4 a ton for "unburnable" coke with a "very high" moisture content. "Coke," he adds, "is an ideal water sponge, and can hold about 20 p.ct. of its weight of water. Electrical development never had fortune more in its favour." Will "Meteor" quote a few of the "many" gas undertakings that have been obtaining over £4 per ton for "unburnable" coke. We were unaware there are people in the country who will pay that price for incombustible material for "fuel." He might also tell us who has been selling coke with a "very high" moisture content, or the 20 p.ct. which, he says, coke will harbour. Such writing is not clever, and that is a view with which, we know, some of our electrical readers agree. However, it still takes 29 units of electricity to give the potential heat of 1 gas therm. If the electricity industry had been called upon to supply as much heat as the gas industry during the coal stoppage, would it have failed to accomplish the task? Yet the "Electrical Times"—a technical paper—supports the vapourings of a morning newspaper!

Some Points.

Electricity Prices.

Notwithstanding what "Meteor" has to say, other sources of information show that the electricity industry is not immune from criticism and complaint regarding charges. In some cases, it can well be understood, there has been little occasion for raising the price of electricity due to the increased cost of coal. It is not long ago (this before the price of coal took such flights owing to importations) that there were complaints in the newspapers concerning the prices charged for electricity by the companies in London—particularly in the City. Again, having regard to the enormous dividends which these companies have paid compared with those of gas companies (in which dividends descend as the price of gas ascends), it is conceivable that in such cases there would be very strong reluctance to increase the price of current, even though reserve funds might temporarily be affected. At Birmingham, the price of electricity was raised ½d. per unit, owing to the high

cost of foreign coal. At the recent meeting of the City Council, Mr. H. K. Beale, in presenting the report of the Electricity Committee, stated that the drop in the price of home-produced coal had brought a sudden demand from all classes of consumers for the price of electricity to be at once reduced. From his remarks, it appears that the large manufacturers have the price of energy regulated every month by the price of coal; and for the first months of the strike they had the benefit of coal which the Department had in stock, and which was below the market price at the time. But stocks had to be made up at a price which ruled for the time being; and therefore those electricity consumers who reaped the benefit in the summer must now meet a corresponding disadvantage. It was not until the middle of October that the price was raised to the small consumer; and by that time, Mr. Beale stated, the Department had lost, owing to the increased price of coal, something like £62,000. He added that the ½d. increase would come off as soon as they got straight again; but the losses must be first made up. That is sound finance; but perhaps the meteoric writer in the "Electrical Times" will disagree. However, the industrial and financial magnates of the gas and electricity industries will have little difficulty in assessing his comparisons at their proper value. Twenty-nine units at ½d. per unit make an increase of 14·5d. per therm. That he cannot deny.

Electric Wires and Gas-Pipes. In the "Electricity Supply Memoranda" last week, reference was made to a case in which derelict bell wires in a house became live wires through a fault in the electrical system, with the result that the gas-pipes feeding a bedroom gas-fire became perforated, and a fire started under the flooring. Fortunately, as then related, the trouble was seen in time to prevent what might otherwise have been a grave disaster. We see from a report in a Dundee paper that Bailie Wright, the Convener of the Dunfermline Corporation Fire Engines and Lighting Committee, stated at a meeting of the Council that two recent fires in the city were apparently caused by the fusing of electric wires situated close to gas-pipes. This has somewhat perturbed the members of the Committee; and they have asked Bailie Wright and Councillor Hoggan, with the officials, to inquire into the question, with the view of reporting as to the advisability of adopting by-laws providing for gas and electric services being placed at sufficient distance apart to prevent the risk of fires.

The Mystery Measure. Speaking recently at a dinner of the Political Circle of the Constitutional Club, Lt.-Col. J. T. C. Moore-Brabazon, Parliamentary Secretary to the Ministry of Transport, had something to say on the subject of the new electricity scheme. He stated that a great feature of the Government measure was the new physical entity called a "grid," which, he explained, meant the connection of selected generating stations. Of course, it means something more than that; if the scheme is to be carried through in its entirety, there will have to be the construction of an immense distribution system throughout the country. We agree with Lt.-Col. Moore-Brabazon that the "grid" is a great feature of the scheme; but it is one of the most doubtful in regard to the attainment of the objects which the Government had in view in promoting the scheme. The speaker said that the selected stations would be those which are most efficient, and would produce electrical energy at the lowest cost. When these are linked up by means of the grid, he asserts there will in due course be great savings, partly because the number of stand-by plants will be reduced, and partly owing to the better adjustment of the load factor. When Lt.-Col. Moore-Brabazon knows something more about electricity distribution, it may dawn upon him that generation economy is one thing; distribution uneconomy, another. And it is not at all unlikely that, as the scheme develops, the latter will wipe out the former, and leave a balance on the wrong side. He also remarked that the selected stations would be run by the Central Board while non-selected stations would be closed-down, subject to certain conditions—the chief being that no station would be closed unless the Board could supply power at a cheaper cost than the station was previously able to do. On this particular rock, the scheme may be wrecked. How will it be possible, until the scheme is very largely developed, for the Central Board to say that they can supply at a cheaper rate than the station which they propose to close down? Assuming that they cannot do so at the time, what is going to happen? They will be unable to add to their load the supply of that particular district. Furthermore, that district cannot be allowed to suffer in respect of its demands for electricity; and if it be possible for a non-selected station to increase its own plant, and yet be able to supply at a lower figure than that at which the Central Board could supply, will the station be debarred from raising fresh capital for the purpose? If so, then it seems to us that this will be a transgression of the protection afforded by the new measure. The recent report of the Electricity Commissioners shows that the costs of electricity supply are being reduced, and consumption is going up in the most satisfactory manner, without the aid of what Mr. J. B. Braithwaite, the Chairman of the City of London Electricity Supply Company, described in his recent address to the shareholders as the "mystery Bill." In his opinion, the introduction of the new Central Board will only result in raising the price of electricity, and checking the development of the industry.

A Threatened Industry. Under this title the "Electrical Review" has called attention to an aspect of the Government electricity scheme of which little notice has so far been taken. It points out that the scheme must affect detrimentally the engine-building industry, so far as the home market is concerned, inasmuch as it will destroy the demand for the smaller generating sets, and steam and oil engines of the lower powers. There is another point. It is that the reduction of the electricity stations in the country, and the amassing of production in large unit stations, will tend to bring about the concentration of the manufacture of the plant in the hands of two or three firms, which will wipe out the free competition which exists at the present time. Of course, on the other hand, assuming that the electricity scheme does not result in lowering power costs to industrialists, it may have the effect of stimulating the demand for small private generating sets. Our contemporary opines that there is still a place for the small power station; and if crude oil can be obtained in quantity by the low-temperature carbonization of British coals (as the Government confidently anticipate), it is its view that it will be difficult for any super-power station, 20 or 30 miles from the consumers, to show as low a total cost as the local station driven by modern oil-engines. Our contemporary adds: "Be it always remembered that the cost of distribution is by far the largest item in the total cost of electricity. Much harm has been done to electricity supply by the repeated promises of electricity at a penny or even less per KW.-H.—a price which, if attainable on the average, will certainly not apply to all consumers and all classes of load."

Our Daily Bread. We sympathize with William Beattie, Ltd., of the Dennistoun Bakery, Glasgow, and the consumers of their products. In the "Glasgow Herald" for Dec. 17, there appeared the following advertisement, which was headed "Apology": "Owing to a serious breakdown in the Corporation electricity supply of light and power in our works, we regret that there is a possibility that our customers may not be able to receive their regular quantity of bread, &c., to-day; and we trust that they will accept our apology for any shortage in supplies, or delay in service."

A Failure and Christmas Shopping. Through the failure of the electric light, Christmas shopping was somewhat interfered with at Acton last Wednesday night. In shops and at the Post Office business had to be transacted by candle light. The collapse occurred just before 7 p.m.; and the current had not been restored two hours later. Fortunately the streets are lighted by gas. A reporter states: "By a coincidence, the Acton Fire Brigade was called to a small outbreak of fire in the showrooms of the Metropolitan Electricity Supply Company."

Coal Handling Plant at Poole.

Describing, with plans and photographs, the aerial transporter coal handling plant at the new Pitwines Works, Poole, of the Bournemouth Gas and Water Company—installed under the superintendence of Mr. Philip G. G. Moon, the Company's Engineer and Manager—our contemporary "Engineering" remarks that this possesses a number of interesting features arising from conditions imposed largely by the peculiarities of the site. The original gas-works adjoin the town quay in Poole Harbour; the coal being waterborne, and easily unloaded from the ship by a transporter extending above and across the quay roadway. The works are hemmed in, however, by houses; and, as the Company serve a coastal area some 25 miles long, much of which is still undergoing development, extensions more than sufficient to satisfy immediate needs were recognized as being imperative. Extension of the old works being impracticable, the Company purchased a site about 500 yards distant from them, at Pitwines; but to supply the new works with coal involved some means of communication with the old works and the quay through the house property referred to. The solution of the difficulty lay in the construction of the cable way which is described in "Engineering" for Dec. 24. The unloading transporter at Poole, the cableway conveyor, protection bridges, and loading stations between and at the two works, as well as the telpher transporter at Pitwines, were supplied by the Mitchell Conveyor and Transporter Company, Ltd., of 45, Holborn Viaduct, E.C. 1. The actual construction of the cableway was the work of Messrs. Ceretti & Tanfani, S.A., Bovisa, near Milan, of which firm the Mitchell Company are representatives throughout the Empire.

GAS ACTS FOR 1926.

The Royal Assent having now been given to the Barnet Gas and Water Bill—certain of the water portions of which were keenly contested in the Committee Rooms—it is possible to review the Acts relating to gas supply which have passed into the Statute Book during the past parliamentary session. While indicating the features of the Acts, opportunity may be taken to point out some of the more important alterations which have been made since the main provisions of the measures were set out in the issue of the "JOURNAL" for Jan. 20, 1926.

ASCOT DISTRICT GAS AND ELECTRICITY.

This is mainly a financial measure. The paid-up capital of the Company amounts to £140,000, in 10 p.ct. original shares, 7 p.ct. additional ordinary shares, and 6 p.ct. preference shares; and the sum borrowed to £70,000. These figures represent the total amounts of capital and loans authorized. The demands for gas and electricity in the Company's area of supply continue to increase; and to meet them, further money is needed. The Company are authorized to raise from time to time additional capital not exceeding in the whole £60,000 (including premiums), by the creation and issue of new ordinary shares or stock or new preference shares or stock, or both. The maximum dividends named for this additional capital are 7 p.ct. on ordinary capital and 6 p.ct. on preference capital. In the Bill there was a clause seeking to give authority to the Company to offer, during a period of two years from the passing of the Act, or such extended period as the Board of Trade might allow (and subject to such conditions as the Board of Trade might think fit to impose), capital for subscription by the public, and to pay commission—this commission not to exceed 5 p.ct. This clause, however, is absent from the Act. The borrowing powers granted are one-half of the additional capital authorized. Preference and debenture stock may be redeemable. There is provision for the appointment of a Managing Director or Managing Directors; and some clauses of a usual character regulating the supply of gas are included.

A proviso has been added with respect to a guarantee by H.M. Treasury for a loan to the Company of £26,000 under the Trade Facilities Act. This provides that, so long as the Treasury remains under any liability in connection with this guarantee, or any moneys due to the Treasury remain unpaid, the interest on any debenture stock issued and the principal moneys and interest secured by all mortgages granted by virtue of this Act shall rank after the interest on any debenture stock issued and after the principal moneys and interest secured by any mortgages granted by the Company in pursuance of the powers of any Act of Parliament before the passing of this Act and subsisting at the passing thereof. [*Parliamentary Agents: Messrs. R. W. Cooper & Sons.*]

BARNET DISTRICT GAS AND WATER.

As already remarked, the water provisions of the Barnet District Gas and Water Company's Bill formed the subject of prolonged discussion in Committee; and some of them were struck out. Others, however, remain in the Act—including power to purchase from the Marquess of Salisbury the Hatfield Water-Works. If they do this, they may charge during the period of ten years from the purchase for water supplied for domestic purposes to premises which immediately before the transfer were supplied from the Hatfield Water-Works, such rates as thought fit, but not exceeding those previously paid.

The gas clauses of the Act are not in most respects substantially different from those which appeared in the Bill. The Company are given power to use lands described for gas-works purposes, and to charge for gas supplied by meter prices not exceeding in the urban districts of Barnet, East Barnet Valley, Enfield, Finchley, and Friern Barnet 12·5d. per therm, and in the remainder of the gas limits 16·5d. per therm. A number of usual gas clauses and the agreed "relief from obligation to supply" clause are included. The stand-by charge is not to exceed 25s. for any one quarter. The "A," "B," and "C" 1872 stocks are to be converted into £192,857 2s. 10d. of ordinary stock of one and the same class. This stock is to be divided among the holders of stocks named in the proportion of one and three-sevenths pounds for every £1 now held. The "D" stock and any new ordinary stock to be issued shall form part of the same class of stock. The further amount of £35,000 which the Company are entitled to raise for the purposes of the water undertaking under the Act of 1904 may be raised by the issue of ordinary or preference stock, and applied for the purposes of the water or the gas undertaking as the Company may determine. The Company may also raise further ordinary and preference stock to the amount (including premiums or discounts) of £140,000. On preference stock the dividend is not to exceed 6 p.ct., and on ordinary stock 7 p.ct. (unless a larger dividend be at any time necessary to make up the deficiency of any previous dividend subsequent to Jan. 1, 1927). "Provided that, notwithstanding anything in this or any other Act relating to the Company, it shall not be lawful for the Company to apply any of their funds or profits to the payment of moneys to make up the deficiency of any dividend paid or payable more than five years previously." Further borrowing powers are included—£261,500 in respect of existing stocks, and up to one-half of stock issued after the passing of the Act. There is an auction clause, and also provision for offering (with the approval of the Board of Trade) stock to consumers and employees "at the then value thereof," and for subscription by the public, together with the payment (in the latter event) of a commission not exceeding 5 p.ct. Profit-sharing clauses appear in the Act. A number of protective clauses have been inserted. [*Parliamentary Agents: Messrs. Rees & Freres.*]

CHORLEY CORPORATION.

The Act defines the limits of gas supply of the Chorley Corporation, and includes a number of usual clauses. The maximum additional charges for prepayment meter supplies are 10d. per 1000 c.ft. for hire of meter and fittings, or 1s. per 1000 c.ft. if the fittings include a cooker; and for a prepayment meter without fittings 6d. per 1000 c.ft. or 10 p.ct. per annum on the cost of the meter, whichever shall be the higher. Specifications made by the Corporation with regard to the minimum size and the material of pipes and fittings to be installed by the owner or occupier of any premises are to be approved by the Board of Trade, who, before giving such approval, may refer the matter to an independent gas engineer, and may, if they think fit, direct such engineer to hold a public inquiry. Copies of approved specifications are to be kept for public inspection at the gas office, and to be purchasable by any person at the price of 6d. each. Notice is to be given to the Corporation (for their approval) when pipes or fittings are to be installed, together with particulars as to size, materials, &c.; and the Corporation are to have right of inspection. Premises of a railway company (not being a dwelling house or appurtenant to a dwelling house) are exempted from the provisions of this section; and such premises are also exempted from the clause relating to power to compel repairs of piping or appliances in a dangerous condition. The latter section empowers the Corporation, if a consumer fails to carry out work necessary to remove the cause of danger, to cut off the gas; and for the purposes of the section the Corporation (except in the case of premises other than a dwelling house of any railway company) shall, subject to the provisions of section 21 of the Gas-Works Clauses Act, 1871, have the like powers of entry as are exercisable under that section.

When coke is sold by weight, and is delivered in quantities exceeding 2 cwt., there is to be a weight ticket or delivery note. Coke sold from any vehicle in quantities exceeding 14 lbs. but not exceeding 2 cwt., is to be in sacks "with a metal label affixed to the top of every such sack indicating the correct legal weight or measure of coke therein." [*Parliamentary Agents: Messrs. Lewin, Gregory, & Co.*]

GAS LIGHT AND COKE COMPANY.

By their Act of 1925, the Gas Light and Coke Company were empowered to provide any moneys required for the redemption of mortgage bonds of the Brentford Gas Company or of certain redeemable debenture stock to be issued by the Company to holders of redeemable debenture stock of the Brentford Company by the creation of ordinary stock or preference stock. The Company, however, determined not to exercise their powers of raising money by the issue of ordinary or preference stock; and the present Act repeals these powers, and authorizes them to borrow sums not exceeding in the whole one-half of the nominal amount of the issued capital. Any debenture stock created under the powers of the Act may be redeemable. The Company are empowered to demand for copies of the shareholders' address book or any part thereof supplied by them any sum not exceeding 9d. for each folio of 72 words copied. Clause 11, which refers to dividends on the ordinary stock, reads:

> If and whenever, under the provisions of section 34 (reduction of standard price and amendment of enactments relating to sliding scale) of the Act of 1909 as amended by the Gas Light and Coke Company (Charges) Orders, 1921 and 1926, and of section 9 (redemption fund) of the Act of 1903 as amended by this Act, or either of those sections, the rate at which the dividend actually payable to the holders of the ordinary stock of the Company in respect of any half-year would be less than 5 p.ct. per annum, the Company or the Directors (as the case may be) may declare and pay out of any moneys available for the purpose a dividend on the said ordinary stock at any rate not exceeding 5 p.ct. per annum, provided that, in addition to such payment, there be set aside as a contribution to the redemption fund referred to in the said section 9 such a sum (if any) as would, under the provisions of that section, as amended by this Act, be required to be set aside in relation to the dividend so declared and paid. Provided that:
>
> (*a*) If at any time within one month after the expiration of a period of five years from March 1, 1927, or of any succeeding period of five years any authority (being a local authority within the meaning and for the purposes of the Gas Regulation Act, 1920) having jurisdiction within any part of the limits of supply for the time being of the Company shall apply to the Board of Trade for an Order annulling or suspending the operation of the provisions of this section or reducing the rate of 5 p.ct. per annum referred to therein, the Board of Trade may, if they think fit, make an Order annulling or suspending for such period as they may decide

the operation of the said provisions or reducing to such extent as they may determine the said rate of 5 p.ct. per annum;

(*b*) If and so long as the operation of the said provisions is suspended or the said rate is reduced below 5 p.ct. per annum by virtue of any Order made under the foregoing proviso (*a*), and for the time being in force, the Company may at any time within one month after the expiration of any such period of five years as aforesaid apply to the Board of Trade for an Order cancelling such suspension or increasing such reduced rate, and the Board of Trade may, if they think fit, make an Order cancelling such suspension or increasing such reduced rate to any rate not exceeding 5 p.ct. per annum;

(*c*) Any Order of the Board of Trade under this proviso shall be made under, and in accordance with, the provisions of section 10 of the Gas Regulation Act, 1920, with respect to the making of Special Orders; and

(i) for the purposes of this proviso the expression "the undertakers" in the schedule to that Act shall mean the applicants for the Order; and

(ii) any such Order shall for all purposes be deemed to be a Special Order within the meaning of the said Act;

(*d*) Any Order made under the foregoing proviso (*a*) or (*b*) shall during the continuance thereof have the same effect as if enacted in this Act.

As to dividends on the 3½ p.ct. maximum stock: "Sub-section (3) of section 34 (reduction of standard price and amendment of enactments relating to sliding-scale) of the Act of 1909 shall be read and have effect as if the paragraph commencing with the words 'In any half-year' and ending with the words 'shall be reduced by 1s. 8d.' were omitted from that sub-section." There are new redemption fund provisions. [*Parliamentary Agents: Messrs. Dyson, Bell, & Co.*]

Halifax Corporation.

Part V. of the General Act secured by the Halifax Corporation relates to their gas undertaking. It is provided that the price charged for gas by meter shall not at any time exceed 1s. 3d. per therm. The maximum charge for the hire of a prepayment meter and fittings is 3d. per therm if a cooking stove is included, and 2·5d. per therm without a cooker. The charge for the hire of a prepayment meter without fittings is not to exceed 1·5d. per therm or 10 p.ct. per annum on the cost of the meter, whichever may be the higher. Provision is made for the revision of the price of gas in altered circumstances, upon representation being made to the Board of Trade by the Corporation, any local authority within the gas limits, or twenty consumers. The calorific value is fixed at 400 B.Th.U. The Corporation may specify the minimum size and the material of pipes and fittings; and they may also compel repair of piping or appliances in a dangerous condition. For the latter purpose, the Corporation shall, subject to the provisions of section 21 (power to enter buildings for ascertaining quantities of gas consumed) of the Gas-Works Clauses Act, 1871, have the like powers of entry as are exercisable under that section. Internal piping of railway companies (other than in a dwelling house) is exempted from this provision. The Corporation may cut off and refuse to supply gas to any person whose payments for the supply of either gas or electrical energy, or meter rent in respect of the supply of gas or electrical energy (in the Bill, these words followed: "or for the purchase or hire of gas or electrical stoves, fittings, or other appliances"), are for the time being in arrear, whether such payments be due in respect of a supply to the same or to other premises. [*Parliamentary Agents: Messrs. Lewin, Gregory, & Co.*]

[*To be concluded.*]

AMERICAN GAS ASSOCIATION.

Notes from Reports and Papers—Second Article.

Complete Gasification.—Kreisa Process.

Returning to the report of the Carbonization Committee, it may be mentioned that there is in it a contribution by Mr. R. S. McBride to the subject of complete gasification. Among American developments in this direction, those which have been most frequently referred to in the past are the Doherty, the McDonald, and the Wilcox plants. Apparently the last-named has been used only on low-grade western bituminous coals, lignites, &c.; while the two former are not, so far as the author is aware, being used at any point commercially, either for town gas or industrial gas supply.

One new system of complete gasification which has been brought to the attention of American gas engineers during the past year is the Kreisa process, which has been utilized at several European works with a wide variety of English and Continental gas coals, lignite, brown coal, &c. After study of European conditions and successes, an American company have taken over the agency for the process in that country, and at the present time are working on designs suited to American conditions; but the work has not progressed to the point of affording commercial trials or actual operating figures. Further discussion of the process is therefore reserved for subsequent reports of the Committee.

The greatest success in complete gasification of coal without the use of coal carbonizing equipment has, Mr. McBride says, been attained through the use of bituminous coal as water gas generator fuel. Each successive annual report of the Water Gas Committee of the Association has demonstrated further progress. The results now widely realized indicate that millions of tons of bituminous coal will undoubtedly soon be dealt with by this means. Thus complete gasification is being achieved in fact, if not in name. The result of this method of treating bituminous coal is a gas which closely resembles in heating value and flame characteristics the form of blue water gas which has previously been well-known. The product does contain substantial percentages of the gases resulting from low-temperature distillation of the coal; but with most efficient operating methods the increase in heating values thus caused is offset by an additional amount of inert diluents—especially when the blow-run system is used. Because of the low heating value of the gas from this process of complete gasification the uncarburetted water gas from bituminous coal does not yet offer attractive prospects for town supply alone, and so does not afford the gas engineer that relief from dependence upon gas oil which has been sought.

The growing use of coke as a household fuel may, he thinks, create a demand which will become one of the most important factors working against rapid and extensive development of complete gasification by means of combined coal gas and water gas systems. This problem of coke supply renders more important than ever before the question as to whether gas manufacturing can properly be carried out as a purely public utility business, or whether it should be regarded as a multi-product manufacturing operation. As a public utility the expenses and income must all be figured with a view to determining the net cost of gas per 1000 c.ft.; whereas as a manufacturing business each product can be expected to bear a share of overhead and capital expenses, and return a reasonable proportion of the total profit expected.

McEwen-Runge Low-Temperature System.

There has been installed at the power station of the Milwaukee Electric Railway and Light Company a low-temperature carbonization plant on the McEwen-Runge system having a capacity of 210 tons a day. In this system advantage has been taken of the direct contact of the heating medium with the coal, and also of the fact that by this method of operation the more finely divided the coal is, the quicker the distillation, and the more efficient in general the operation will be.

This commercial unit for the carbonization of pulverized coal, Mr. Walter Runge explains, is comprised of two vertical retorts, one superimposed above the other, each exactly the same in design, and having an inside diameter of 6 ft. 9 in. and an over-all height of 38 ft., with a carbonizing or treating zone of 30 ft. The coal is introduced into the top of the uppermost retort, and falls in a dust-like cloud, meeting in its descent a current of upwardly rising hot inert gases. In this way, the coal is brought to a temperature of 500° without the loss of any of the valuable bye-products. The gas from the top of the retort may be passed directly to the atmosphere. This treatment not only dries and pre-heats the coal, but also destroys any coking properties it may possess—which is desirable in material that is intended for pulverized fuel burning. The coal from the upper retort is introduced at a temperature of 500° into the top of the lower retort, where it meets an ascending current of hot gas which, in this instance, is the combustible gas of the process. The temperature of this gas is such that the average throughout the retort is between 1000° and 1100° Fahr.—sufficient to distil the coal and drive off the volatile constituents. All this gas is of high B.Th.U. value, and is handled in the usual bye-product apparatus. The coke is of a fine sandy nature, practically all of it passing a 10-mesh screen; and with slight treatment it is admirably suited for pulverized fuel operation.

A little more than half the work is done in the upper retort; and the gas from this retort, passing to the atmosphere, does not require treating. The dilution of the rich gas from the coal is prevented, and the volume of gas to be handled is naturally halved. The retorts contain no moving parts in the coal-treating zones. As nearly as can be determined, the distillation of the coal occupies a period of only 35 seconds in each retort.

Dehydration of Gas.

Various methods of dehydrating manufactured gas are discussed in a paper contributed by Mr. F. W. Sperr, Jun., Re-

search Director of the Koppers Company, Pittsburgh, who says that in the dehydration of coal gas by refrigeration, the loss of heating value due to deposition of light oil would be expected to be much less than in dehydration by compression. Experiments made by the Research Laboratories of the Koppers Company, in which coke oven gas of 535 B.Th.U. was cooled by passing it through a coil of copper pipe placed in a freezing mixture, showed no appreciable reduction of heating value at temperatures over 5° Fahr. Below this temperature, the heating value diminishes quite rapidly. These tests were made on gas which had been treated in the naphthalene scrubber of the Seaboard Bye-Product Coke Company, the amount of oil used in this scrubber being about 20 gallons per million cubic feet. Earlier tests made on coke oven gas with a heating value of 585 B.Th.U. cooled by direct contact with the sodium carbonate solution used in the Seaboard Liquid Purification Process showed an average loss of 5 B.Th.U. per cubic foot at 38° Fahr. There was no loss at 45° Fahr. The tests reported by C. Aschoff [see "JOURNAL" for May 20, 1913] on coal gas at 512 B.Th.U. showed no appreciable reduction of heating value at 7° Fahr. At 3·6° Fahr. there was a loss of about 10 B.Th.U. These tests were made by indirect cooling. Not much information is available on the effect of cooling of carburetted water gas of the lower heating value used in present-day practice; but the loss for a given amount of cooling might be expected to be somewhat higher than for coal gas of the same heating value. Cooling by direct scrubbing with water or brine would probably be very effective in removing naphthalene; but its action on gum-forming constituents of gas is unknown, and would have to be determined experimentally.

Drying gas by means of chemical substances would have the general advantage of dispensing with any great amount of compression or artificial cooling, so that loss of heating value through removal of light oils would be reduced to a minimum. The utmost precautions would, however, have to be taken to prevent entrainment of the desiccating substance. The absorption of water by reagents, such as calcium chloride or sulphuric acid, is an exothermic process liberating relatively large amounts of heat; and special cooling means must be provided to prevent the temperature of the system from rising to such a point that dehydration is no longer effective. Means must also be provided to re-concentrate the diluted chemical, or else to dispose of it in some way that will not involve too great expense for new material.

Calcium Chloride.

Although the dehydration of gas by means of solid calcium chloride offers possibilities worthy of investigation, it suffers the general disadvantages that always attend a large-scale treatment of a gas with a solid reagent. If regeneration is conducted *in situ*, special precautions have to be taken to prevent liquefaction of the calcium chloride, because many of the solid hydrates melt readily at moderate temperatures. Where it is unnecessary to attain extremely high efficiencies in the removal of moisture, a saturated solution of calcium chloride may be more convenient in practical application. With a comparatively small amount of artificial cooling, it should be possible to accomplish satisfactory dehydration of gas with a calcium chloride solution, even under unfavourable conditions of temperature.

Sulphuric Acid.

Concentrated sulphuric acid is a very effective desiccating agent, and has the advantage of being capable of application in liquid form. A very satisfactory degree of dehydration may be accomplished, even with ordinary 60° Bé. sulphuric acid; but in the employment of sulphuric acid, it is essential to use such an amount that the strength of the diluted acid is always greater than the equivalent of 50° Bé. At lower concentrations, the acid attacks iron and steel; and expensive acid-proof apparatus must be employed. The absorption of moisture liberates a large amount of heat. This heat is sufficient to raise the temperature of the system as much as 63° Fahr., without allowance for radiation loss. This assumes the use of 60° acid with gas saturated at 79° Fahr. The outlet gas from such a system would theoretically have a temperature of 142° Fahr. Such an increase of temperature would increase the vapour tension of the sulphuric acid to a point where efficient dehydration of the gas would no longer be possible. With 60° acid, therefore, cooling must be employed in one form or another.

If concentrated acid (66° Bé.) is employed, cooling is theoretically unnecessary, but should probably be performed, as the heating of the gas to such high temperatures would be undesirable from a distribution standpoint. It has been found experimentally that the sulphuric acid reacts with certain of the unsaturated hydrocarbons in the gas, forming small amounts of tarry matter which have to be removed from the system from time to time. The heating value of the gas is not appreciably affected; and the removal of such hydrocarbons would probably be an advantage, because it is likely that they consist chiefly of the so-called gum-forming substances.

The principal objection to the use of sulphuric acid for the dehydration of gas is the inconvenience and expense of re-concentrating the diluted acid. In the system proposed by Mr. C. J. Ramsburg, of the Koppers Company, this difficulty is completely eliminated. In this system the acid from the dehydrating apparatus is employed for the manufacture of ammonium sulphate in the regular bye-product recovery operations. This can be done, using acid of 50° Bé., without any inconvenience in the operation of the sulphate plant; and under normal conditions the amount of sulphuric acid required for dehydration of surplus gas from a bye-product coke plant just balances the requirements of the sulphate plant operating in connection with the production of the gas.

The possible entrainment of sulphuric acid must, of course, be strictly guarded against. It is proposed to place a catch box, filled with magnesite (magnesium carbonate) or some other neutralizing agent, in the line directly after the last stage of the dehydrating apparatus; and experiment has proved this to be absolutely effective in removing every trace of acid.

Silica Gel.

In the application of silica gel to the dehydration of manufactured gas, certain special problems would have to be worked out. The material is a very active adsorbent for the benzole; and, in fact, it has been used for the recovery of benzole from coke oven gas. It has, however, been shown that, in the treatment of moist gas containing benzole, the latter is adsorbed by the silica gel in the initial stages, but later is gradually displaced by water, until finally no benzole remains in the gel. It is stated that in operation most of the adsorbable illuminants will be displaced by the moisture and returned to the gas, and the remainder will be recovered from the condenser by steam activation, and can be returned to the gas by sprays.

Precautions must be taken in the activation to avoid mixing of gas and air. It is understood that this can be accomplished by the proper use of steam. In the adsorption of water by silica gel, the heat of condensation is liberated; but it is considered unnecessary to employ any special cooling means to deal with this.

Possible Results.

The author discusses other possible methods, and expresses the belief that, in a system of medium size, the direct net financial saving due to dehydration might be in the neighbourhood of 2 c. per 1000 c.ft.; and in a small system it might be much greater. This is taking into account actual book charges for complaints, meter repairs, drip pumping, &c. The indirect value of dehydration, on account of better service and greater advantage from the standpoint of competition against other fuels and against electricity, would certainly be greater.

In addition to the matter of cost, a few possible disadvantages that might attend the distribution of dehydrated gas have been suggested:

(1) The question has been raised whether the distribution of dry gas would involve scrapping the water-sealed holder. It is true that an ideal system would employ the waterless type of holder; and dehydrated gas would have the advantage of eliminating any frosting difficulties with this type of holder. However, it is believed that, with the use of a layer of oil in the water-sealed holder, the amount of moisture that would be picked up by dehydrated gas in a system of this type would be negligible.

(2) Dehydration might increase the amount of leakage in the distribution system, on account of drying-out of material in pipe joints, and because of the opening of small leaks normally sealed with moist material. The author is advised that the records of some companies who have changed from manufactured gas to dry natural gas do not substantiate this theory, while others have noted some increased leakage. The trouble would be largely overcome by adopting a system of oil lubrication.

(3) It is possible that in changing a system from saturated gas to dry gas any deposits in the system will tend either to harden or else to take the form of fine dust and be carried along with the gas. This disadvantage would be removed if the system were kept lubricated with oil; and in any event it would disappear in time.

Foreign Coal at Lytham.—The whole of the foreign coal ordered by the Lytham St. Annes Gas-Works has been received and used. During the dispute, the undertaking supplied 1120 tons to industrial concerns, &c. When coal is at less than the average price on present contracts, a reserve stock of 4000 tons will be collected.

"From Colliery to Can."—This is the title of a brochure issued by the National Benzole Company, Ltd., Wellington House, Buckingham Gate, S.W.1, in which they have weaved a thread of romance into the somewhat hard technical facts regarding the production of National benzole. They explain to prospective customers that, by purchasing this product of British collieries, they are assisting the exploitation of a British bye-product industry.

MEASUREMENT OF TEMPERATURE.

Meeting of Chemical Engineers at Birmingham.

On Friday, Dec. 17, Mr. F. Heron Rogers, Chairman of the Chemical Engineering Group of the Society of Chemical Industry, presided at the Birmingham University at a joint meeting of that Group with the Midland Section of the Society of Chemical Industry.

Prof. J. W. HINCHLEY (Imperial College of Science and Technology), who was the first Chairman of the Group, lectured on the "Measurement of Temperature in Technical Practice." He pointed out that this was different from laboratory work. Every instrument employed must justify its use by increased profit through improvement in production or reduced cost of production, by the elimination of waste, and by reduction of repairs, or of time taken up on works' operations, or of fuel used. On this account a simple device for temperature measurement was usually a more efficient arrangement than a general temperature indicator; and, if it were inexpensive, it would always receive favourable consideration from the "powers-that-be." In giving a rough outline of the basic principles under all temperature work, Prof. Hinchley said his object was to encourage chemical engineers to devise their own temperature measuring instruments, especially where economic considerations precluded the use of expensive apparatus. There were two distinct methods of indicating the temperature of a material: (1) By associating with it an indicating substance, which became, from a heat point of view, a part of the material, and indicated by some physical property its own temperature; and (2) by the analysis or measurement of the radiation from its surface. Both systems had their own special utilities and range of accuracy. The first method was that most commonly employed in works practice, while the second was only applicable to solids, liquids, and dense vapours. It was, however, the only method available for measuring the temperature of inaccessible bodies or for extremely high temperatures.

It was their business as chemical engineers, he thought, to bring the Centigrade scale into practical use; the present Fahrenheit system was often a source of trouble.

The problem of fixing a scale of temperature had been generally attacked by adopting the temperatures of melting ice and of boiling water as two fixed points. Unfortunately, practical men in this country had not adopted the most reasonable scale, in which 0° and 100° were assumed for the value of those temperatures, but were still content with the Fahrenheit zero. There was no reason, in his view, why they should not use the hydrogen gas thermometer as a practical standard. There could be no critical discussion of measurement of temperature without a consideration of the general principles of heat transmission. One must understand the behaviour of heat before one could attempt to measure it. Unfortunately the theoretical and mathematical treatment of the subject, for the last hundred years, had been far ahead of their practical realization. In measuring the temperature of gases, probably the greatest errors occurred; and, in this regard, radiation entered largely. The thermometer in an ordinary room was supposed to indicate the temperature of the air, but it often indicated radiation from the walls. It was a useful plan to place on the thermometer a silver shield.

Mr. T. F. E. RHEAD (Chief Chemist, Birmingham Gas Department) stated that his staff had constantly to take temperatures at five gas-works; and pyrometers were in general use. In the laboratory, the personal factor was possibly a matter of minor importance; but where the work was done on wholesale lines, under difficult and uncomfortable conditions which induced fatigue, the personal factor became most important. Many instrument makers did not realize that a chemist or physicist would not get accurate temperatures unless he was working under comfortable conditions. There was need for more robust instruments for use on the works.

"HELLER-BAMAG" COKE-QUENCHING SYSTEM.

In our issue for July 14 last, we gave a general account of the new system of coke quenching which has been operating successfully at the Potsdam Gas-Works for some time. We are now able to supplement this with further details from a description by Dr. Oswald Heller, the patentee, which appeared in "Das Gas- und Wasserfach," Oct. 16, 1926.

A general view of the plant was given in our previous article; and the following description can be followed by reference to the accompanying diagram of the system, showing the quenching chamber, the steam generator for production of clean, high-pressure steam, and the preheater in which water is heated for the spraying of the coke and for feeding the generator.

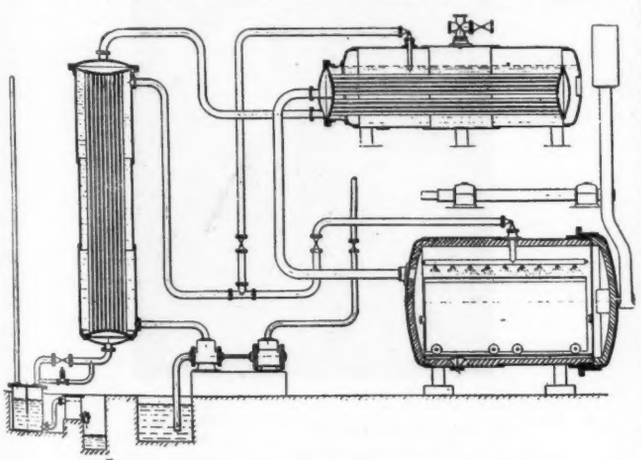


Diagram of the Heller-Bamag Coke-Quenching System.

The coke is electrically fed into a trough-shaped tank, which conveys it to the quenching plant, and, with it, enters the quenching chamber. It can be adapted for use with any form of chamber, whether horizontal, inclined, or vertical. It should be noted that this is the only movement to which the coke is subjected until it is discharged quenched on to the screens. It arrives in the quenching chamber at a temperature of 900° to 1100° C.; and the chamber is then made steam-tight by the closing of an electrically actuated cover. This is of special design, and rotates at the end of an arm about a pivot, being counterbalanced by a weight at the other end. To open it, it is first moved directly outwards away from the opening, and then swung round about the pivot. When the cover is tightly shut, the hot coke in the quencher is sprayed with water at about 140° to 150° C. This, of course, gives rise to vapours in the chamber, which consist principally of steam and water gas, but contain also sulphurous acid, sulphuretted hydrogen, and traces of ammonia. This naturally cannot be made use of directly, as it would soon adversely affect any mechanical parts with which it came into contact. The spraying with superheated water soon gives rise to high pressures in the quenching chamber, which amount to as much as 14 atmospheres and more; and these high-pressure vapours are employed for the production of pure, superheated steam, by passing them through the tubular system of the upper boiler. In the Potsdam plant, steam of 6 to 8 atmospheres pressure is generated in this way.

By the time the gases from the quencher have passed through the upper boiler, most of the water vapour has condensed out, and water gas forms a considerable proportion of the remaining vapours. This, together with the condensates, passes on through the preheater from top to bottom, where practically the whole of the remaining water vapour condenses out, leaving water gas and condensates to pass out through a pressure-retaining valve at the bottom. As can be seen from the plan, the vapours practically maintain the pressure that prevails in the quencher until they have passed the valve at the bottom of the preheater. Here the condensates are run to waste, while the water gas passes through an ascension pipe to mix with coal gas from the settings. The feed water is pumped, of course, in the opposite direction, and leaves the preheater at a temperature of about 140° to 150° C. From here it is directed by appropriate valves either to the upper boiler or to the sprayers in the coke quencher, as required.

MODE OF PROCEDURE.

The mode of procedure is as follows: When the hot coke is sprayed with water at 140° to 150° C., the pressure in the sealed quencher rises rapidly, and, after about a minute, the required degree—viz., 12 to 14 atmospheres—is indicated by the pressure gauge. The valve at the outlet of the preheater has been previously set to resist exactly this required pressure in the whole system. Spraying of the coke is continued so long as the gauge shows that the maximum pressure is being maintained. When, however, the coke has given up most of its heat to the quenching vapours, a drop in pressure is indicated on the gauge, and a bell signal warns the attendant to stop spraying. The coke has now a certain water content; but it is still at a temperature rather above that corresponding with the vapour pressure in the quenching chamber—that is to say, it is at about 200° to 220° C. Before the chamber can be opened, the rest of the quenching vapours must be evacuated; and this is accomplished by simply opening the pressure valve at the outlet of the preheater. The vapours under pressure

then pass out through the system, and, at the same time, there is a further evaporation of water from the coke, amounting to about 8 p.ct.; the temperature of the coke falling to about 100° C. This provides a ready means of regulating the amount of moisture remaining in the coke. By longer spraying, for instance, 12 p.ct. of moisture can be left in at the end of the first stage, and, as 8 p.ct. is removed by the after-evaporation, the final quantity is 4 p.ct.

The whole of the heat of the coke from about 1000° C. down to 100° C. has thus been usefully employed. The actual quenching takes about 8 minutes, so that, making ample allowance for opening and shutting the cover, bringing the coke and removing it, the time occupied by the whole operation is, at the outside, 15 minutes. By increasing the heating surface, this could be reduced to 10 minutes; or two quenching chambers could work together in one unit, and so still further reduce the time required. The special construction of the cover is such that its tightness increases with increasing pressures within the chamber. The makers have been fully satisfied with its working in the Potsdam plant. The space occupied is very economical; 10 ft. by 20 ft. being ample in most cases. If space is scarce in the neighbourhood of the retort house, only the actual quencher need be situated there; it being then connected-up with the boiler and preheater wherever it is convenient to place them.

WORKING RESULTS.

Actual working results from the Heller-Bamag system show that about 50 cub.m. [1760 c.ft.] of water gas and 300 kilos [660 lbs.] of steam are produced from 1 ton of coke. Considerable importance is attached to the effect upon coke quality of the gradual quenching with steam, in contrast with the ordinary method of sudden cooling with cold water, the result of which is to increase the proportion of small coke. At Potsdam, before the introduction of the system, there was enough small coke under 10 mm. [0·39 in.] to supply the boilers. This is no longer the case, and saleable coke has increased by 22 p.ct. In the following table, Heller-Bamag screening results are given, and, for such comparison as they afford, the results obtained in a similar screening test at another works with ordinary wet quenching and with the Sulzer dry system.

Mesh.		Wet.	Sulzer.	Heller-Bamag.
Mm.	In.	P.Ct.	P.Ct.	P.Ct.
0–10	0 –0·39	18·0	14·1	4
10–25	0·39–0·98	15·6	12·6	12
25–40	0·98–1·56	20·2	10·4	23
above 40	1·56	46·2	62·9	61

Further tables are given to show the payability of the system, as applied to employment on a carbonizing unit of chamber ovens, quenching 80 charges of 1·2 tons each every 24 hours. The coke is firm, and of excellent appearance; and the process works with cleanliness and absence of dust. The author is of opinion, though it has not yet been proved, that the system reduces the sulphur content of the coke.

MIDLAND JUNIOR GAS ASSOCIATION.

The subject of "Dry Meters" was discussed at a meeting of the Association, held in the Council House, Birmingham, on Thursday, Dec. 16. The subject made a popular appeal; the attendance being the largest for a very long period. Mr. C. F. TOOBY (the President) was in the chair.

DRY GAS METERS.

By A. KNIGHT.

[Extracted.]

I will try to give those responsible for the buying of dry gas meters some idea of the great care needed, in both design and manufacture, to produce a meter which will register correctly. A solder used in the manufacture of dry meters must be of good quality, and should consist of not less than 60 p.ct. of tin combined with 40 p.ct. of lead. We will proceed to examine in detail each part of a 5-light meter.

Valve Plate.—A rectangular piece of heavily tinned mild steel (gauge 6 × S) with a flange turned at right angles on each side, to add strength. Five holes are pierced in the plate—two for the valve gratings, two for the rod wires operating from the diaphragms, and one to supply the gas from the inlet pipe to the valve chamber. The valve plate looks simple, but it is the most important part of the meter. Should any of the valve or rod-wire holes be out of relation to each other, it is impossible to divide the valve covers correctly.

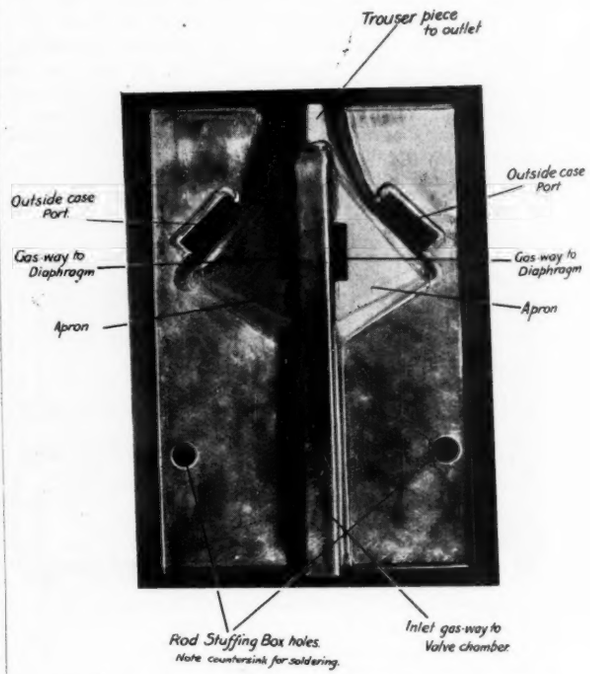
Grids and Covers.—These are made of an alloy of tin and antimony, usually consisting of 65 p.ct. of tin and 35 p.ct. of antimony. Great care has to be used in getting the right fusing point. The valves are of the D slide type. Each grid has three port openings. The outside ones are those which supply the measuring chambers, and the middle ports are the exhausts to the outlet pipe. The cover, which is the sliding part of the valve, is domed in the centre to allow the returning gas from the measuring chambers to enter the exhaust, or middle, port. The gas enters the measuring chambers from the outside of the covers while the latter are in sliding motion, and escapes into the middle port underneath. The dome acts as a bridge over the bars separating the port opening of the grid. The pressure of the gas, acting upon the outside of the covers, keeps them on their seatings. The grids are soldered into position; this being the first operation in assembling the meter.

Trouser Piece.—This is a tinned steel stamping of 2 × S gauge, and in shape is similar to a pair of trousers. It is half round at the waist, and tapers down to nothing at the end of each leg. It is placed in position so that each leg covers the middle port of one grid. When it is soldered along the four sides, a channel is made for the gas to flow from the measuring chambers to the outlet pipe. Great care is needed when soldering along the inner side of the trouser piece; for, should a leak be discovered after the meter has been erected, great difficulty is experienced in remedying it.

Valve Plate Gasway.—A tinned steel stamping of 3 × S gauge, with one end shaped to fit snugly into the centre of the trouser piece. It is placed along the centre of the valve plate, and is soldered along its sides. This forms the gasway from the inlet pipe to the valve box chamber.

Aprons.—These are stampings of 3 × S gauge, which are shaped to fit between the legs of the trouser piece and the valve plate gasway. When they are soldered in position, they form inside port chambers for connecting up to the inside of the diaphragms.

Sides.—Two rectangular tinned steel stampings of 6 × S gauge, with side flanges. The latter give additional strength, and to them the back and front are soldered. In each side is a hole, over which the side pipe is fitted. One hole connects the inlet pipe to the valve plate gasway, and the other connects the trouser piece to the outlet pipe.

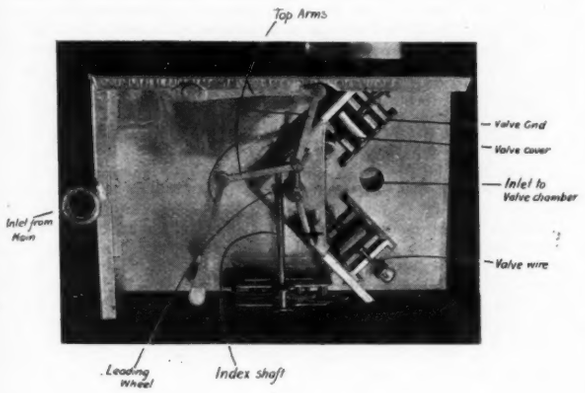


Bottom Rod and Studs.—The bottom is also a rectangular stamping of 6 × S gauge, flanged on its four sides, and is the same size as the valve plate. The rod studs are cast white metal. These are soldered into position before the bottom is soldered to the sides. The solder must be well sweated. This will prevent leaks from one chamber to the other when the division plate is put in.

Division Plate.—Another rectangular stamping of 3 × S gauge, flanged on the four sides. This is tacked into position, thus dividing the case into two parts. The valve plate is now fitted in, and pushed down to fit snugly on the top side of the division plate, so that the holes in the sides correspond to the end of the gasway pipe on the left-hand side, and the trouser piece on the right-hand side. It is good practice to solder

round the four sides of the division plate before proceeding further.

Side Pipes and Lumps.—Two half-round tinplate stampings of 6 × S gauge, with tin discs let in the bottom. The lumps are two brass castings screwed on the top, to fit the caps and linings. The bottom is left plain. The plain part is tinned, and let into the top of the side pipe, and well sweated with solder. When soldering, care must be taken not to melt the solder of the division plate, which is directly behind the side pipes.



Meter Feet.—These are four small dish-like tin stampings of 6 × S gauge, and are soldered to the bottom of the meter. This allows a current of air to circulate under the meter.

Throat Pieces.—These are curved tin stampings of 3 × S gauge. They form the gasway from the diaphragm port of the valve plate to the inside of the diaphragm. They are soldered to the apron and the division plate.

Diaphragm Rims.—Most 5-light meters made to-day have rims or pans for the construction of the diaphragms. This method, in my opinion, has many advantages over the bag type which has been in use for so many years. The rims are made of tin plate of 3 × S gauge, being 9½ in. in diameter and 1⅞ in. deep, and swaged on the top edge. They are soldered to the division plate on either side of the meter.

Diaphragm Wires.—There are several ways of fixing the leathers to the rims or pans, such as covered steel bands, with lugs and pins and nuts. When these are used, the leathers are attached to the outside of the rim or pan.

Diaphragm Leathers.—As the diaphragm leather is one of the most important parts of the meter, it is necessary to pay special attention to the quality. All leathers used in Birmingham are now " semi-chrome tanned " to a specification originally employed by the South Metropolitan Gas Company.

In the method we use of attaching the leather to the rim, and making up the diaphragm, no heat is necessary. This is a point in favour of the pan diaphragm. In the old bag type, the tin disc had to be soldered to the rim, and the heat in some cases had a bad effect upon the leather, causing it to crack at a point near the rim, and pass unregistered gas.

Tee Pieces.—These consist of two legs and a roller cast of white metal, composed of 36 parts of lead to 15 parts of antimony.

Flags.—These are slightly hollow tin stampings with metal turned over at the sides, to give additional strength. One end is rolled right over to fit the flag rod, and the other end is half rolled to fit the roller part of the tee piece. It is necessary to see that the flag is thoroughly sweated with solder to the flag rod, and also to the roller of the tee piece. This part of the mechanism is subjected to strain in working; and any shoddy workmanship at this point proves fatal.

Flag Rods.—These are tinned iron wire with pointed ends, to fit the flag rod studs.

Motion Wires, Guides, and Feet.—Motion wires are tinned iron wire bent at right-angles. Their function is to steady the motion of the diaphragms. Guides and feet are of white metal.

Flag Rod Stuffing Boxes.—These are brass circular boxes with screwed tops, being 1 in. long, ⅛ in. in diameter, and having an ⅛ in. hole. We have experienced serious trouble owing to the method of soldering these boxes to the valve plate. In many instances the box is placed on the top of the valve plate, and is soldered round. In such cases it is impossible, by looking at the outside soldering to ascertain whether it has been properly sweated.

Precaution is taken to prevent the soldering of the boxes breaking away. The tinwork is sunk round the stuffing box hole in the valve plate. The box is tinned, and let half-way through the plate. This allows a good body of solder to be put round the box.

Before the flag rod and tee piece are put into position, a tin washer is slipped over the top side of the rod, and is finally soldered approximately 3/32 in. from the bottom of the stuffing box. This gives sufficient play for the rod, and prevents it from coming out of the flag rod stud.

Galleries.—These are stamped out of 6 × S gauge tinplate, and are rectangular in shape. Top and side edges are turned at right-angles. The bottom edge is thrown slightly outward, to prevent solder from running into the case when back or front is being fixed. Special attention must be paid to the inside seams, to see that the solder is well sweated through.

Backs and Fronts.—These are stamped out of 6 × S gauge tinned plate. They are hollow stampings, allowing room for thorough expansion of the diaphragm. When back and front are soldered to the meter, the outside work is finished.

Bridge.—This is a **V**-shaped stamping of 26 gauge tinplate, and is edged at the top. This is soldered to the valve plate; thus making the valve chamber.

Cock Plate.—This is a triangular tin stamping of 23 gauge tinplate, with a hole in the centre for the crank stuffing box. This is attached to the bridge.

Crank Stuffing Box.—This is a brass circular box, ⅝ in. deep, ½ in. in diameter, with ⅛ in. hole, and screwed top. It is soldered to the cock plate.

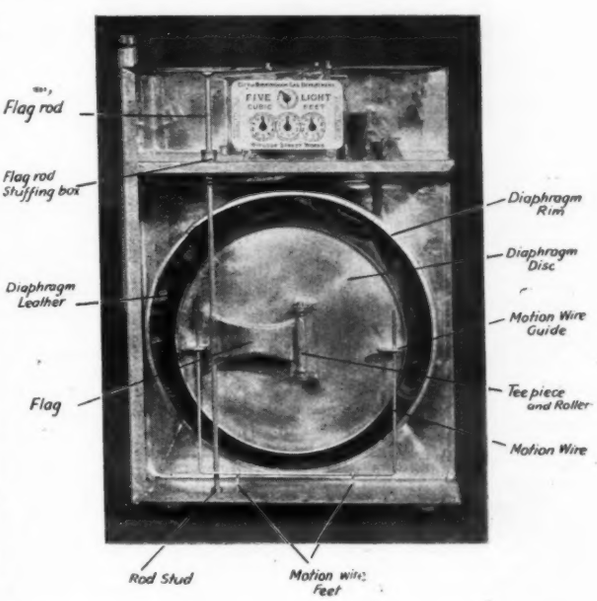
Crank.—This is made of hard metal, the component parts of which are 66 p.ct. of copper and 33 p.ct. of zinc, and works in the crank stuffing box.

Valve Arms.—These are most important, and must be manufactured from the correct mixture of metals that will stand the wear of the crank and the valve pillars. Worn holes in these arms cause erratic registration and numerous other complaints.

Back Plate.—This is a rectangular tinplate stamping of 26 gauge, and encloses the valve box.

Stuffing of Boxes.—We find that one of the primary complaints of a dry meter is leakage in the top; and when we investigate the cause of it, in many instances we find gas leaking through the stuffing wool inside the box. As the soundness of meters is all-important, we cannot pay too much attention to the quality of the wool, fat, and wads, and to the method we employ in stuffing these boxes. A rod stuffing box, if properly stuffed, will take one felt wad at the bottom, 20 in. of well-fatted ten-ply wool, with a wad on the top, and the brass top of the box well screwed down. The crank stuffing box, being smaller, will take the above-mentioned wads and approximately 10½ in. of wool.

The Birmingham Gas Department have had submitted to them two 5-light dry meters, with special stuffing boxes. In one meter all stuffing boxes are mercury sealed; the objects being to eliminate any fear of gas leaking through the boxes, to ensure freedom of working, and to minimize loss of pressure at the outlet of the meter. In the other meter, all the stuffing boxes are connected, with brass tubes, to the outside of the front gallery, so that, at any time, with a grease gun, grease can be forced to all the stuffing boxes.



Top Arms.—These are stamped out of sheet brass, and have a movable joint. Before they are attached to the flag rods, a small washer is fixed approximately 3/32 in. from the top of the rod upon which the arm is placed. They are then sweated well together.

Crank Worm.—This is of brass, and is soldered to the crank pillar.

Backstop.—This is a brass stamping with a stop attached. Should the meter be connected backwards for any reason, the

tangent would hit the stop, and gas would not pass through the meter under normal conditions.

Cross-shaft.—This consists of a spindle and a wheel. The spindle is slotted at one end, to fit the index. The wheel is geared into the worm; the number of teeth in the wheel being arrived at by the capacity of the tangent per revolution.

Index.—The calculation and registration are arrived at by mechanism, consisting of wheels cut with varying numbers of teeth, together with pinions, spindle, crank, and worm. The parts are carefully geared, and fitted together to correspond with the pointers and markings shown on the dial of the index.

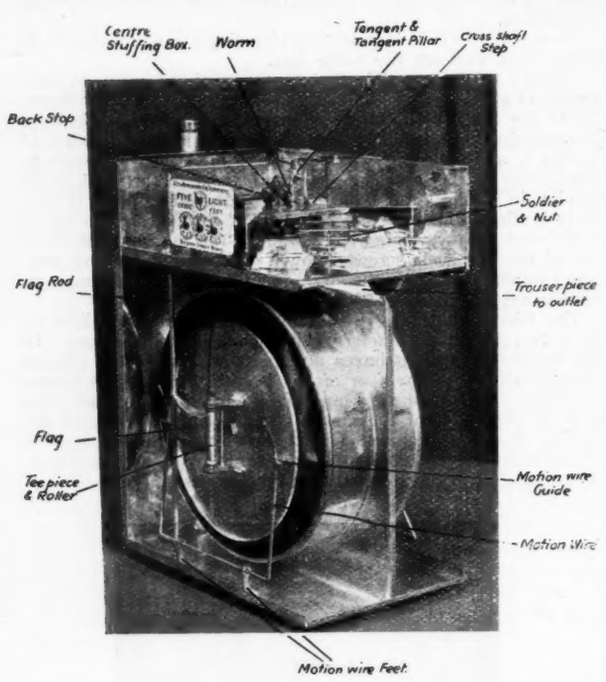
Index Case.—This is a tin stamping fitted with ¼ in. plate glass. Should it be necessary to renew an index glass *in situ*, care must be taken not to melt the soldering of the valve plate, which is directly behind the index case bottom.

Back Studs.—These are tin plate stampings, ½ in. deep and 1 in. in diameter.

Tangent.—This is a most important part of the mechanism, and its functions are to regulate the capacity of the diaphragms and the openings of the various ports of the valves, and to get correct measurement of the meter, not only at 80 c.ft. per hour, but at any rate at which the meter is called upon to work.

One or two progressive meter firms have designed, and are making, a special range of meters which will not be known by "lights" or standard sizes, but by rate per hour.

How the Meter Works.—There are four measuring chambers in a dry meter—the inside and the outside of the diaphragms



—and the ports of the valves are connected to each chamber. The gas enters at the inlet (which is situated on the left of the meter), passes to the long gasway (which is on the underside of the valve plate), and enters the valve chamber, with the pressure of gas upon the valve covers. Should the diaphragm port of the valve be open, the gas will pass into the diaphragm. While the diaphragm is being inflated, it is at the same time expelling the gas from the outside case, through the case port of the valve under the hollow cover, to the centre or outlet port, along the breeches gasway, and to the outlet of the meter. Should the case port of the valve be open, the gas entering will expel the gas from the diaphragm through the diaphragm port, under the hollow cover, to the outlet of the meter. These actions take place alternately on each side of the meter.

The straight motion of the diaphragm is transformed to the circular action in the top of the meter in the following manner. Soldered to each diaphragm are the tee piece and the flag, which are attached to the flag rod. For each motion of the diaphragm, each flag rod rotates one quarter of a circle. This operates the jointed top arms, which are soldered to the flag rods and are attached to the tangent pillar. The tangent is soldered to the crank, and this is connected to the valves by metal arms, thus causing the concentric motion. The leading worm is soldered to the crank, the leading wheel is geared to the worm, and the cross-shaft to the index, which registers the gas as it passes through the meter.

Discussion.

The PRESIDENT said the paper was of unusual interest to distribution men. Dry meters did their work, on the whole, very well. The question of meters deserved the fullest consideration having regard to the great load put upon many of them. They were loads which it was never intended the meters should carry when they were installed. Had the author had experience of new meters of a high capacity, which could be bought at a low price? Again, did he find that the life of the leathers was as long as before the war? Their experience at Coventry was that it was not so long as formerly. He would also like to know of a good dressing for meter leathers. At his works they used almond oil and blacklead.

Mr. H. R. HEMS (Senior Vice-President), moving a vote of thanks to Mr. Knight, congratulated him upon his contribution. He would like to know of some of the defects experienced after the dry meter had been in use for some time. What was the action on the metal parts, and why was it that some of the meters came back for repair? He would have liked to hear comparisons made as to the respective merits of dry and wet meters, particularly in the larger sizes.

Mr. R. J. ROGERS (Birmingham), who seconded the resolution, said the detailed information given would be most useful to many men. It must be admitted that the component parts of dry meters were not as well known by name as they should be. During the last five or six years a notable advance had been made in construction. Their experience in Birmingham with the chrome and semi-chrome leather had exceeded expectations. Since they used the semi-chrome leather, they had not had a meter back for burst diaphragms. What the effect was on unaccounted-for gas, it was impossible to say. It must, however, be an important factor. Stuffing boxes had for some time been occupying the attention of designers in that field of work, because the existing method had proved not altogether satisfactory. Experiments made in connection with the stuffing boxes working with mercurial seal had still to be proved in practice; but the arrangement certainly did not appear to offer a solution to many of their difficulties arising from leakages. The Gas Committee had authorized the purchase of a number of meters fitted in this way, for test on the district. Mr. Knight had alluded to the meter which was fitted with grease cups under the stuffing boxes, and also to the oil reservoir which enabled oil to pass on to the leather. The need for the lubrication of leathers was not quite so acute as it was formerly, when they used leather of a different tannage. The more pliable they could keep the leather, the longer should be its life. Meters thus provided were also to be tested on the district. The question of high-capacity meters was one which during recent years had pressed itself upon them, because the apparatus which was used to-day called for a meter that would respond to registering greater volumes of gas in private houses than ever before. While they desired to fix meters which would register gas correctly at all consumptions, they had to keep an eye on the capital expenditure, and also on the sizes of the meters. Increasing the capacities of the meters would afford considerable help in this direction. In Birmingham, for the last ten or twelve years, they had insisted on the capacity of 5-light meters being a little higher than that of the meters sold by most manufacturers. The Gas Department had been making their own 5-light ordinary dry meter. Mr. Knight had designed a prepayment meter which, on the district, had proved to be a reliable and accurate instrument.

The vote of thanks was unanimously passed.

In the general discussion, a large number of questions were asked.

Mr. HULME (Smethwick) said he failed to see much advantage in the high-capacity meter, having regard to the additional wear to which it would be subjected. Loss of pressure was an important consideration. There was the additional fact that a higher stamping fee had to be paid.

Mr. KNIGHT, replying to the discussion, pointed out that the work thrown upon the high-capacity meter was considerably reduced in comparison with other meters, owing to its larger capacity per revolution. It was apparent that some alterations would be necessary to the ordinary meter, to get over the loss of pressure at the outlet. He had got 0·333 c.ft. per revolution out of an ordinary 5-light meter, but was losing five-tenths pressure when passing 120 c.ft. per hour. It was proposed to put in larger gasways, also to open the ports of the valve grid. This would reduce the sliding surface of the meter valves. With these alterations, he had every confidence that the excessive loss of pressure would be overcome. More effective use, too, would be made of the leather. As to the dressing of the leather, they used paraffin, paraffin wax, and best whale oil. The metal parts of the meter showed evidence of wear after a time; and if a meter was worked excessively, the holes in the crank arms was also prone to wear. A result, sometimes, was interference with registering. If the metal for the valves were not properly fused, whistling might occur after the meter had been in use for a few months. It was essential that the fusion of the antimony and tin should be correctly done. Water in the meters might be due to several causes—to the quality of the gas, to the fitting of the meter in a position where there were draughts, or slight leaks in the top of the meter. It was a bad practice to turn a meter upside-down. Very little liquor could be removed through the inlet. The fixing of plugs in the bottom of dry meters for the release of condensation was not allowed by the Board of Trade. The easiest remedy was to "bleed" the meter by making a small hole, and filling it up afterwards. As to registration, it was clear that, if the diaphragm shrank, a faster result would obtain; if it hardened, cracking soon followed. A meter in good condition should register correctly if the pressure were increased. The automatic valve could be taken out and renewed easily. The suggestion for the provision of ball bearings at the bottom of the crank box appeared worthy of consideration.

The lecture was illustrated by a full set of the component parts of a dry meter; and a glass-cased dry meter was shown in action. Dry meters, both ordinary and automatic, in process of manufacture were also exhibited, as well as a special meter indicating the method of conveying grease to the working parts and oil to the diaphragms.

GAS UNDERTAKINGS AND THE FUEL PROBLEM.

[Extract of a paper by Mr. H. P. Lupton, of the Liverpool Gas Company, before a Joint Meeting of the Liverpool Section of the Society of Chemical Industry and the Fuel Section of that Society.]

What are the essentials which should be fulfilled if we are to maintain the progress and prosperity of our country? The coal raised should be so treated as to yield, at the point of consumption, the maximum amount of utilizable energy. There should be no production of smoke, and labour should be reduced to a minimum; and the chemicals which form the raw materials for many important industries should be preserved. The process used should, if possible, tend to conserve our coal supplies. We have been told, during the past year or two, that electricity, if more generally adopted, would secure for our country the prosperity it so badly requires. There is no doubt that electricity is a convenient form of energy, since it is clean, easy of control, and adaptable. Unfortunately, however, electrical energy generated from coal is only obtained at a great cost. At the present the most efficient generating station uses 1·51 lbs. of coal per unit generated, or, in other words, the process has an efficiency of only 20 p.ct. The average efficiency throughout the country is only just over 10 p.ct.; so that from one ton of coal of a calorific value of 28 million B.Th.U., only 2·8 million B.Th.U. are available in the form of electrical energy. Tests made by us on electric oven hotplates show that the efficiency of the heaters is about 50 p.ct. Electric fires are frequently stated to operate at 100 p.ct. efficiency; and while this may be true of convector heaters operating at "black" heat, it cannot be true where the fire emits both heat and light energy. In any case the 100 p.ct. could only be obtained if no air went up the chimney hot enough to produce the ventilation which is essential to healthy conditions. If, then, we take the efficiency of electrical apparatus as being 75 p.ct., we find that from 1 ton of coal there is actually used only 2·1 million B.Th.U. in useful work. If we take the efficiency of utilization of coal in the home as 20 p.ct, then from 1 ton we should obtain 5·6 million B.Th.U. Thus, if electrical energy had to supply domestic purposes, $\frac{5{\cdot}6}{2{\cdot}1} \times 40$ million, or over 106 million, tons of coal would have to be consumed. Even if inferior coal could be used at the generating station, or if the Electricity Supply Bill fulfils the expectations of its promoters, it is evident that the price of electrical energy must be high. There is one other point in this question of the generation of electrical energy from coal which requires notice, and that is that the chemicals which it is possible to obtain from coal are completely lost.

GAS THE IDEAL FUEL.

Let us now consider the treatment of coal as carried out by gas undertakings. By this method, in which coal is subjected to high-temperature carbonization, the community has returned to it, as gas, coke, or chemical products, from 75 to 80 p.ct. of the total heat value of the coal. From one ton of coal are obtained 72 therms as gas, or 7·2 million B.Th.U., and 10 cwt. of coke with a thermal value of 13·44 million B.Th.U. If the efficiency of utilization of gas be taken as 60 p.ct., and that of coke as 35 p.ct., then from one ton of coal there are obtained 4·32 million + 4·70 million, or 9·02 million, B.Th.U. of utilizable heat. If the gas and coke were to replace the raw coal used for domestic purposes, there would be a saving of at least 15 million tons of coal per annum. As many people are finding, gas is an ideal fuel. No storage is required; it can be turned on and adjusted to, and maintained at, the desired temperature; it need only be consumed as and when required; it involves no labour or dirt before, during, or after use; and it is smokeless. For intermittent heating it is as cheap as coal. For continuous heating, however, it is admittedly dearer. Here, its companion product, coke, supplies the want.

RESEARCH.

The gas industry realizes the value of its smokeless fuels, and would like to see them being universally employed. The prices required, however, have so far operated against this desire. But the highest possible efficiency, either from the thermal standpoint or as regards cost, has not yet been attained; and the industry is making greater efforts every year to reduce the costs of the processes it employs, and to improve the efficiency in use of its fuel-consuming appliances. Many of the larger gas undertakings now employ highly-trained research staffs, while a large amount of research is being carried out under the guidance of a Joint Committee of the University of Leeds and the Institution of Gas Engineers.

If the man in the street could only realize how dependent he is on many of the products of coal carbonization, he might not think, as he undoubtedly does at present, that electricity is his one and only hope for the future.

It must be said that any method which, striving to provide fuel in a form other than coal, wastes the greater proportion of the potential heat of the coal and at the same time destroys the chemicals—in the use of which so many of our population find employment, and the products from which are so essential to everyday life—cannot be one which is for the ultimate good of the nation. It must be urged that, of all the methods at present in use for the utilization of coal, that employed by gas undertakings is the one most likely to maintain the progress and prosperity of our country.

BRICKS WITHOUT STRAW.

By NORTON H. HUMPHRYS.

Consumers of gas are favoured by special attention from Parliament. No other industry is more closely hedged round, or can point to a larger number of clauses relating to price, purity, profits, and penalties in cases of default. The Gas Referees have full right of entry to both works and district at all times and seasons, and for obtaining information from workmen or others. And while no credit or allowance is considered when the declared calorific value is exceeded, default is severely dealt with by a direct fine on profits. An ordinary offender under the Adulteration Acts may escape anything worse than a trifling penalty. A complete statement of the financial position and of the working results is available to the public (incidentally to the great assistance of prospective competitors) by means of audited annual statements of account, and elaborate Government returns. A large number of departmental inquiries have been conducted by committees from time to time, of which the effects of carbon monoxide and of the percentage of inerts are examples. Leaving out common law such as the Acts relating to weights and measures or joint stock companies, every old-established statutory gas undertaking has accumulated a formidable stock of Acts and Orders, primarily based on the model Acts of 1847, 1871, and 1920, but with alterations and additions to suit local circumstances.

SPECIAL ACTS AND ORDERS.

Speaking generally, a Special Act or Order is not self-contained, but may include one or more previous enactments, and a number of clauses from several others. Some of the included matter may have been subsequently repealed, so that an accurate statement of the law relating to certain important matters cannot be arrived at without lengthy research and some experience in Parliamentary practice. No better evidence could be forthcoming, in illustration of the importance, the magnitude, the universal character, and the large demand for a supply of gas from all classes of the community, as an absolute necessity to modern civilized life.

These onerous obligations have been accepted without demur, and honourably observed. In the United Kingdom there are some 800 statutory controlled gas undertakings, of which many have been in existence for more than fifty years. Yet the number of legal proceedings on record, originated by wilful default, and not brought about by unforeseen or uncontrollable circumstances, can be counted on the fingers of one hand. As respectable law-abiding citizens, gas undertakings are fully entitled to as much consideration and respect as are all other members of the community who are free from charges of law-breaking, and who would naturally resent espionage and special attention from the police force, either as unwarrantable insult or as official bumbledom.

A singular feature of all this grandmotherly care is that quite half the total sales of gas, as supplied by municipal authorities, small private joint stock companies, manufacturers who have found a private gas-works desirable, and individuals, is not subject to statutory control. Municipal authorities, not without some show of reason, have looked askance at the Gas Regulation Act, and few have accepted it. Yet there is no reason to suppose that statutory gas is in any sense superior, or that consumers are prejudiced by its absence. There is no instance on record of consumers demanding statutory control as being likely to give them any advantage. On the contrary, the average consumer does not believe in it.

One explanation of the remarkable indifference shown by the rank and file of coal miners to serving as cat's-paws for revolutionary propaganda is that any opposition would jeopardize prospective benefits for unemployment, sickness, or old age, to which, as subscribing members, they are justly entitled. Many gas undertakings have accepted the 1920 Act more from reasons of similar character than on account of cheerful acquiescence with the powers granted to the Gas Referees.

CONSUMERS' GOODWILL.

The importance of securing the goodwill of consumers is a stronger incentive than the 1920 cat-o'-nine-tails, which is based on the assumption that, in the absence of control, gas

undertakings will follow the nefarious practices known to be common among some other traders, and send out inferior or adulterated gas; and that the consumer is either too unsophisticated to discern the imposition, or believes that he has no remedy. All progressive gas undertakings are fully alive to the advantage of sending out an article that is above suspicion. In every supply district are to be found users of gas engines at full maximum power, manufacturers who require to boil large volumes of water, or melt metal within a given time, and others who in a general way have overdrawn their service or meter capacities. All these are sensitive to even a trifling alteration in specific gravity or calorific value. And every consumer receives a periodical statement of the amount due, or paid in advance, for gas. The suppliers know that a dissatisfied customer is a minus advertisement, and already half-way toward the substitution of other schemes for the supply of light and heat. This is the reason why consumers do not suffer by the absence of statutory control.

RAILWAYS AND COLLIERIES.

Regarded as an example of Government industrial control, the successful results are an exception. Take as an example two other important lines of industry in which gas happens to be interested—the railways and the collieries. Railway tariffs are higher than in any other leading country, and coal is simply in a state of chaos. During a generation or more, the Government have endeavoured to nurse and control the sale of coal, but both employers and workers have proved fractious and intractable. A noticeable feature is absence of that care for the consumer which is so prominent in gas legislature, the more remarkable because all authorities are unanimous that cheap coal for home and export is essential to British supremacy. Our enemies and competitors are alive to this. Proposals have been decisively refused, and departmental reports have been either condemned as impracticable, or criticized out of existence, rather than accepted as a basis for action. Colliery owners say that they are working at a loss, miners complain of starvation, and the purchaser has something to say against quality, price, and uncertainty of supplies. There never was such an extraordinary combination of unanimous discontent.

The Government have failed to do anything that would benefit the purchaser of coal, and consequently he is unprotected from unscrupulous exploitation by factors and vendors, and from price combines, which are successfully engineered without Government support. An explanation from a colliery office issued a few weeks ago was to the effect that a reduction in price at a neighbouring pit was not "authorized." This implies the existence of a price combine able to control selling prices.

That the manufacturers of a product, subject to strict statutory control in the matters of quality and price, are not only entirely without similar protection applied to their staple product, but subject to a permanent depreciation of quality originated by Government control in 1918-19, is a remarkable anomaly, entirely unexplainable by Government inquiry. The departmental reports are chiefly featured by impracticability, lack of unanimity, and a strong family likeness to the old-time fable known as "old man, son, and ass."

INCONGRUITY.

Law-ridden gas undertakings have a right to ask why strict statutory control should be limited to the selling side of the counter, and to point out the incongruity of being expected to meet the rigid requirements of the Gas Referees, on material that is not only sold without guarantee, but in no way protected from incorrect description. The railway companies are by far the most extensive and efficient breakers of coal extant, seeing that coal presumably loaded and certainly paid for on a "70 p.ct. large" basis, has been found after a short railway journey to contain nearly an equal proportion of fines and dust.

Few undertakings have found themselves able to take full advantage of their right to adjust the selling price of gas to a figure that will yield the maximum rates of dividend on the working for 1926; and many have even chosen diminished profits as an alternative. Consumers have been considerably benefited by receiving gas at a substantial reduction on actual cost, and have not hesitated about taking full advantage, emergency directions notwithstanding. Reduced supply pressures, far from economizing output of gas, were attended with increased consumption, especially among the smaller class of customers. A similar result was experienced in 1921, as the influence of a four months' strike can hardly be traced on examining the total sales of gas during that year.

INCREASE IN PRICE.

When an alteration in price of gas is necessary, the convenience of customers should be the first consideration. They do not like extensive changes, and would greatly prefer 1d. a therm increase, in force for a year or more, to 4d. on one quarter only. This fact is commended to the consideration of impulsive individuals who rush into print with violent assertions to the effect that, if a reduction in cost of coal on Tuesday is not reflected in the price of gas on Wednesday, the consumer of gas is unscrupulously exploited by money-grabbing monopolists.

THE EMERGENCY DIRECTIONS.

The quality clauses in the 1920 Act were temporarily abrogated by Part VII. of the Emergency Directions; and their withdrawal is probably coincident with an immediate return to the official examination and report.* In fact, the Referees, refreshed by a long vacation, are already resuming their war paint and feathers. But the position of gas undertakings and their coal stocks should not be overlooked. The established custom at this time of year is to get sufficient coal to last until the end of January. If the winter weather happens to be severe, there is a large demand, and also the possibility of delays in transport. With doubtful prospects of an early settlement of the dispute, the possible further support of the miners from a foreign source, and the knowledge that some weeks must elapse between resumption of mining and a return to normal output, there was reason to anticipate a serious, if not a desperate, condition. So a general practice was the placing of large foreign orders, late in October, to cover winter requirements, and with a margin suggested by the delays, and entire or partial curtailment of orders, which created so much anxiety during the summer and early autumn. During the last few weeks these later requisitions have been fully and promptly filled, and sometimes in advance. The result is that the average stocks are excessive, or further consignments remain for future delivery. During the next six or eight weeks, gas-works will be dependent on mixtures of foreign coal which are unreliable and uncertain in quality. Some samples cannot by any means be made to yield gas up to the declared calorific value; others will not leave any residual coke worth the name. The retort house working conditions that will secure optimum results can only be determined by prolonged experience, and strange coal cannot be worked to the best advantage.

DELIVERIES OF COAL.

The same applies in a lesser degree to deliveries of coal following closely on a long stop, sent out during the interregnum between the start and the full resumption of the normal stride. The first deliveries after the four months' stop in 1921 were not up to average, and spontaneous combustion was in evidence to an unusual extent if the new material was stored for a few weeks. A suggestion that gas managers have a remedy at hand, by purchasing (say) two-thirds of the daily requirements from the usual sources, and taking the remainder from the stock of foreign coal, emanates from a source where both financial and working conditions are unknown quantities. The former will in most cases necessitate postponement of additional purchases to the latest possible moment; and the blending of coal for gas making requires much judgment, if satisfactory results are to be obtained. Promiscuous mixing may be attended with unfortunate consequences, and the times are not congenial for experiments.

While the exemption afforded by clause 29 in the "Directions" would be of some financial advantage in normal times, its value under strike conditions is extremely doubtful, and gas undertakings should not be expected to render any equivalent in return. In any case, shareholders cannot get more profit than is permitted by the statutes; and in these days when everybody is out for the highest possible prices, they cannot reasonably be expected to accept less. The supply of an inferior article at a lower cost of production will automatically adjust itself to a lower selling price. Under maximum dividend terms, the whole of the saving goes to the consumer, and, in any case, by far the greater part.

Official examinations and penalty clauses should be postponed for a period sufficient to admit of setting the house in order. An immediate resumption is the same thing as an order for the full tale of brick without straw.

The Referees have autocratic power to satisfy themselves that any fines inflicted are taken directly from the pockets of shareholders who are in no way responsible, as from "sums applicable to dividend." But what is to be done if losses on the current year's work not only absorb all reserves, but leave a deficit on profit and loss? A defaulter in course of the present month may have no sums applicable for dividend on Dec. 31. This is no fancy picture. In many cases the loss due to the nine months' strike is equivalent to two years' maximum dividend. Full reserves in 1914 have frequently entirely disappeared by Dec. 31, 1921; and any sum since accumulated is limited to surplus profit earned during 3¾ years. In the event of an undertaking without funds applicable to dividend being fined, would the default be a first charge on prospective profit, and thus aggravate an already desperate position?

*** Since these statements were in type, the Gas Referees have issued a notification that the abrogation was considered withdrawn on the 19th inst.; and intimated that the difficulties above referred to under heads of "Emergency Directions" and "Deliveries of Coal," were fully appreciated and would receive full consideration.**

The "Fuel Economist."—The December issue of the "Fuel Economist" reprints the speeches made and papers read at the inaugural meetings of the Institution of Fuel Technology. At the end of the issue is a special supplement on the "Chemical Industries of the Empire."

NOTES ON NEW BOOKS.

THE GAS MANAGERS' VADE-MECUM.

"The 'GAS JOURNAL' Calendar and Directory"* is a companion for those responsible for the management of gas undertakings. The same care bestowed upon the first edition has been exercised each year in bringing the contents of this useful "information bureau" up-to-date; and the 1927 issue is an excellent production. It contains in small compass a wealth of reliable information on all matters relating to the manufacture of gas, and a complete list of the gas undertakings in England and Wales, Scotland, and Ireland, together with the calorific values, both actual and declared, of the gas they supply, and its amount and price. The book should be in the hands or the pocket of every gas manager.

* "The "Gas Journal" Calendar and Directory, 1927. Compiled by Dr. W. B. Davidson; published by Walter King, Ltd., price 7s. 6d. post free.

AN AID TO GAS SALES.

The scope of the "Gas Salesman's Diary and Handbook"* —that "aid to gas sales," which is sold at the modest price of 3s. 6d.—is considerably extended in the new issue. There has been strict revision of all the matter, to keep the information absolutely up-to-date, and the whole arrangement of the text has been altered to allow of the quickest possible reference, heped by a full index. The "useful information" is now divided into sections—lighting, heating, cooking, power, industrial uses, &c.—a plan which will doubtless appeal to its readers—an ever-increasing number. As in former issues, the volume includes a complete list of all the Salesmen's Circles, their officers, and members.

* "The Gas Salesman's Diary and Handbook, 1927." Compiled by Arthur F. Bezant and Norman S. Smith; published by Walter King, Ltd., price 3s. 6d. post free.

MECHANICAL WORLD YEAR BOOK, 1927.

In the 1927 issue of this popular handbook, which is published by Emmott & Co., Ltd., of Manchester, at 1s. 6d. net, new sections have been introduced, and some of the permanent sections have been re-written or revised. One of the new sections deals in a practical manner with belt conveyors.

THE ROMANCE OF BUSINESS.*

Volume II. of "Romance of Great Businesses" has been added by William H. Beable to the earlier work under that title, which gave the story of some thirty famous firms. Twenty more public and private companies have now consented to the publication of their "biographies," which Mr. Beable has dealt with in a straightforward and interesting manner, rendered more attractive by the inclusion of 72 excellent reproductions on art paper of portraits and works and other photographs.

Of greatest interest to ourselves is the history of the Gas Light and Coke Company. It is preceded by the photo of Murdoch, and closed by that of the Governor, Mr. D. Milne Watson, D.L., LL.D.; and the author has done well to present, in but nine octavo pages, such a clear résumé of 114 years' public utility service. True, the transportation from the days when brewers' vats were used for gasholders to the 8-million giant at Beckton is magically quick, and many milestones are unobserved by the author; but he brings home to his readers the wonderful development of the Company by well-chosen statistics. We read that in 1823 the three stations of Peter Street, Brick Lane, and Curtain Road produced 248 million c.ft., and supplied 30,735 lamps through 122 miles of mains; now the annual output is something in excess of 235 million therms, and a million-and-a-quarter consumers take a supply. The gas mains, the author tells us, would reach nearly half-way round the world.

The most romantic reading, perhaps, is that part of the story which deals with the Company's progressive policy and with the spirit of goodwill that has been studiously fostered between the administration and the employees—or rather the co-partners. What a magnificent example is here for other industries! And speaking of the encouragement given by the Company to research, the author says "the public now obtain the benefit of the research and experience of gas undertakings all over the country." Perhaps by this chapter Mr. Beable will have helped the public to realize such things, which we fear escape their notice too often. Wherefore we commend his closing sentence to that small and decreasing public which allows itself to be drawn by the sporadic anti-gas campaign of a section of our daily Press. We read: "The history of the Gas Light and Coke Company is the history of its service to the public, to the State, and to the gas industry generally, and to-day it worthily maintains its place as the greatest Company in a great industry."

* "Romance of Great Businesses" (Vol. II.) By WILLIAM HENRY BEABLE. London: Heath Cranton, Ltd. Price, 15s. net.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Where are the Students?

SIR,—Your correspondent "Looker-on" struck some by no means untrue notes in his communication; and while we cannot agree with the end of his remarks, we are sure that the "Matric." bogey is pre-eminent in many minds. Who can help but admit that the Matriculation Examination of any British University is not only a guarantee of a good education, but a standard which compels universal regard? But the inclusion of this examination as a qualification is debarring many men who have already travelled no mean distance in the profession, whose skill is beyond question, and who perhaps possess all other qualifications, from offering themselves.

Surely some standard, not of education as such, but based on present technical or administrative positions, could be devised and put into practice, which would be satisfactory to those whose student days have become days of business and social activity. This, we are sure, would eliminate many of the objections to the Diploma scheme, since a man's position surely indicates his capabilities, and is, in a measure, a reflection of his training and subsequent value to the industry. There are many young men who already hold positions, to improve which the Diploma must prove invaluable.

We are confident that the Advisory Committee of the Education Scheme did not include the "Matric." standard with the deliberate intention of precluding any worthy members of the profession from offering themselves. That it does so, is an unfortunate but established fact, for many with responsible positions are compelled to devote the whole of their minds and faculties to the progressions of what is to-day an exacting industry.

Surely it is too much to ask them to leave "the home" of regenerators and purifying, &c., for the "temporary lodging" of reflexive verbs and the passive voice—or, greater tragedy, supplant the "GAS JOURNAL" with "La France."

TWO CHOIR BOYS.

Dec. 22, 1926.

LEGAL INTELLIGENCE.

Gas Mains Action Settled.

The action in which the Downpatrick Gas Company were complainants and the Downpatrick Urban District Council were defendants was recalled on Dec. 20 on an *ex parte* motion made before Mr. Justice Wilson in the Ulster Chancery Court in Belfast. The action, which occupied several days last July, was in respect of damage alleged to have been caused to the plaintiff's gas mains by the defendants' steam rollers; and in his judgment Mr. Justice Wilson directed an inquiry at Chambers, to ascertain the cost of repairing the damage to plaintiff's gas mains in John Street, Downpatrick, and the value of the gas which had escaped by reason of the damage. His Lordship further ordered the defendants to pay to plaintiffs the sum so ascertained. Mr. J. C. MacDermott, who (instructed by Mr. H. C. Weir) appeared for the defendants, said that the parties had arrived at an agreement as to the amount of the damage, which was fixed at £60; and he asked that a consent embodying the terms of the agreement be made a rule of court, and that all further inquiries in connection with the inquiry at Chambers be stayed. His Lordship granted the application.

Giant Gas Engine.—The Staveley Coal and Iron Company have commenced the assembling of the parts of a second giant gas engine to be installed for the generation of electricity by using waste gas from coke ovens. It will be one of the largest of its kind in the world. A similar engine was installed last year, and has given every satisfaction. It is not known when the second engine will be ready for operation, as all the parts have not yet arrived at the works. The scheme for the generation of electricity at the Devonshire Works of the Company includes the installation of a third giant gas engine. The Company own three generating stations, and, besides supplying their collieries and works, provide current for the lighting of several villages, including Staveley, Brimington, Clowne, and Eckington, and also a bulk supply to the Corporation of Chesterfield.

Anti-Smoke Abuses.—To the "Yorkshire Post" for Dec. 22 Dr. C. W. Saleeby contributed the following letter: May I, as an unrepentant advocate of smokeless methods in the house, express the hope that the several recent deaths from the use of unsafe gas appliances will make the public very careful in selecting their installations? Manufacturers of gas-heating equipment, mostly foreign, utilized the coal shortage to place on the market low-priced but nasty contraptions, often malodorous, unsafe, and too flimsy to last. Among these are so-called portable fires, cookers, and water-heaters connected to the gas supply by a flexible tube, which discharge the spent gases into the apartment. Such appliances should not be used in any small rooms with the ordinary means of ventilation. Badly constructed and fitted tubes cause leakages of gas. The New York sanitary authorities have made it an offence punishable by heavy fines or imprisonment to sell flexible gas tubing which does not conform to certain tests. Similar penalties are badly wanted here. The absence of an efficient flue is another danger. A chimney or flue with a fire at its base offers the best means of securing the number of changes of air required for health. It is not that the fumes from a gas fire are so dangerous, but the flue removes quantities of the germ-laden air created by the breathing of people in the room. The gas fires now made by the leading British manufacturers are constructed on sound, hygienic lines.

REGISTER OF PATENTS.

Manufacture of Gas Retorts, &c.—No. 261,512.

GAY, R., and GIBBONS (DUDLEY), LTD., both of Dudley.

No. 23,858; Sept. 24, 1925.

This invention relates to the manufacture of gas retorts or other pipes from clay or the like by the well-known press, which includes a cylinder containing the clay or the like, and a piston for forcing the clay through dies mounted at one end of the cylinder. It particularly refers to apparatus for dividing the retort into a plurality of segments as it is being extruded from the machine, and to apparatus for giving the segments support when required.

The apparatus comprises inner and outer dies having cutting blades which extend transversely between the dies and which have their ends passed through or into holes or slots in flanges provided on the dies.

A further feature of the invention, intended particularly for use when silica clay is used, is to provide a supporting shell for receiving the retort or pipe segments from the dies; this shell preferably being divided longitudinally so that the halves or parts can be separated for removing the segments.

The invention can be applied to making gas retorts or pipes of any required cross-sectional shape.

Gas Cookers.—No. 261,609.

RADIATION, LTD., of Birmingham, and YATES, H. J., of Grosvenor Place, S.W. 1.

No. 9855; April 14, 1926.

This invention, which relates to bottom-flue ovens, has for object to arrange for both burner and flue outlet to be situated at the back of the oven.

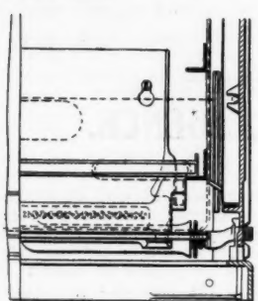


Fig.1

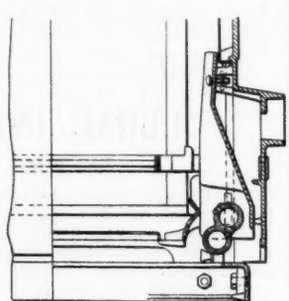


Fig.2

Modified Bottom-Flue Arrangement.

How this is accomplished is clearly shown by the part-sectional front and side elevations which we reproduce. In effect, the invention comprises the employment, between a rear burner and a rear flue outlet, of a partition which separates the said parts and enables the gaseous products to pass out of the oven without interfering with the proper combustion of the gas and the effective circulation of the hot gases through the oven interior; the partition serving as a hood for the burner. Further, the invention comprises the arrangement at the front of the burner of a suitably shaped air-directing and guard plate. Subsidiary flue outlets may be provided below the main outlet, opening into the latter or direct to the atmosphere.

Prepayment Mechanism.—No. 261,105.

SIMPSON, S., of Exmouth.

No. 20,505; Aug. 15, 1925.

This invention relates to the type of prepayment mechanism for gas and similar meters in which a key or other adjusting member is inserted through a hole in the meter casing to set the mechanism to pass a predetermined quantity of gas.

By the invention, the key or member whereby the mechanism is adjusted or set is adapted positively to release the control lever or the like from the control disc or the like. The key is so formed that on its insertion the lever, or other part capable of actuation, is engaged by it and moved to release the disc or the like; and the key has flutings forming a pinion by which the disc may be rotated to the extent desired. The amount of gas corresponding to the position at which the disc or the equivalent is set may be indicated by means of a dial and pointer.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Dec. 15.]

Nos. 30,807—31,496.

ASPINALL, A. E.—"Gas burners for heating stoves." No. 31,005.
BUCHALY, E.—"Automatic safety device for gas heaters." No. 30,837.
GAS RESEARCH COMPANY.—"Gas generators." No. 31,033.
MITCHELL, G. P.—"Gas cookers." No. 30,943.
MITCHELL, G. P.—"Means for heating contents of storage tanks." No. 31,442.
PARKINSON & COWAN (GAS METERS), LTD.—"Wet gas meters." No. 31,159.
SCHMIDT, H.—"Automatic safety-device for gas heaters." No. 30,837.
SOUTH METROPOLITAN GAS COMPANY.—"Means for heating air." No. 31,389.
THORP, F.—See Parkinson & Cowan (Gas Meters), Ltd. No. 31,159.
THURWOOD, T.—"Gas cooking stoves." No. 31,385.

[Extracted from the "Official Journal" for Dec. 22.]

Nos. 31,497—32,128.

CHANDLER, D.—"Gas taps." No. 32,125.
DONALD, W.—"Distillation of coal." No. 31,641.
DONALD, W.—"Low-temperature carbonization of coal." No. 31,863.
FARNHAM, R. V.—"Treatment of carbonaceous material." No. 32,114.
GLOVER & Co., LTD., T.—"Gas meters." No. 31,985.
HADDAN, R.—"Gas burners." No. 31,586.
HANSFORD, J.—"Apparatus for manufacture of gas." No. 31,566.
KLONNE, A. [Firm of].—"Sealing piston for reservoirs for storage of gas." No. 31,702.
LYNCH, H. L.—"Gas ovens." No. 31,953.
MOFFATS, LTD.—See Haddan, R. No. 31,586.
PATERSON, J.—"Gas cooking apparatus." No. 31,971.
SOUTH METROPOLITAN GAS COMPANY.—See Chandler, D. No. 32,125.
STEWARTS & LLOYDS, LTD.—"Bituminous lining of pipe bends." No. 31,511.
WILSON, J. S.—See Glover & Co., Ltd., T. No. 31,985.

MISCELLANEOUS NEWS.

LEEDS UNIVERSITY LECTURES.

Department of Coal Gas and Fuel Industries.—Programme of Special Courses for the Session 1926-27.

From Prof. J. W. Cobb, C.B.E., B.Sc., F.I.C. (Livesey Professor), we have received the programme of the special lecture courses which are to be given next term in connection with the work of his department. The usual practice has been followed of arranging two lectures on each evening, so as to facilitate attendance from a distance. Special attention may be drawn to the course on "Gas Distribution," by Mr. Stephen Lacey, and to that on "Coke Oven Practice," by Mr. C. P. Finn. Both of these gentlemen have special and first-hand knowledge of the subjects on which they are going to lecture. The course Prof. Cobb is down to deliver is, in some ways, of a more general character, and is intended to bring certain matters of importance before students who cannot attend the full University courses.

I.—FURNACES AND THE UTILIZATION OF FUEL.

Prof. COBB.

A series of six lectures on this subject will be given by Prof. Cobb on Tuesdays at 6 p.m. and 7.30 p.m. during the Second Term, commencing Jan. 25, and concluding Feb. 8.

SYLLABUS.

1. First principles, and the measurement, of heat and temperature. 2. Combustion in air or steam. 3. Gas producer practice. 4. Furnaces in general, and heat efficiency. 5. Firing with coal, gas, oil, and dust, boiler furnaces. 6. Recuperative and regenerative furnaces, glass furnaces, metal heating furnaces, &c.

FEE for the Course, 12s. 6d.

II.—PRINCIPLES OF GAS DISTRIBUTION.

Mr. LACEY.

A series of six lectures will be given by Mr. Stephen Lacey, B.Sc., Distributing Engineer, Gas Light and Coke Company, on Tuesdays, at 6 p.m. and 7.30 p.m., commencing Feb. 15, and concluding March 1.

SYLLABUS.

1. Flow of gas in pipes. 2. The function and lay-out of the distribution system. 3. The load factor. 4. Pressure control. 5. High pressure and pumping costs. 6. Maintenance of existing plant, and its adaptation to meet changing conditions.

FEE for the Course, 12s. 6d.

III.—BYE-PRODUCT COKING PROCESSES

(including the Utilization of Coke Oven Gas for Public Supply).

Mr. FINN.

A course of eight lectures by Mr. C. P. Finn, B.Sc., F.I.C., Coke Oven Manager, Manvers Main Collieries Company, will be given on Wednesdays at 6 p.m. and 7.30 p.m., commencing Wednesday, Feb. 23, and concluding on March 16.

SYLLABUS.

Preparation of coals for the coking process. Description of the development of bye-product coking with its accessory processes. Manufacture of sulphate and chloride of ammonia, concentrated ammonia liquor, the recovery of benzene and toluene, cyanogen and sulphuretted hydrogen, tar distillation, and the manufacture of tar macadam. The utilization of coke oven gas for the public supply of heat, power, and light. Low temperature carbonization. Technical discussion of the various types of modern coking installations. The control of such plants and the examination of coals.

Each lecture will be followed by a tutorial discussion on the scientific control of a bye-product coking plant.

FEE for the Course, 15s.

IV.—METALLURGY.

Mr. SUMMERS.

A course of six lectures on the microscopic study of engineering alloys, followed by practical work in the laboratory, will be given by Mr. P. F. Summers, A.R.S.M., on Wednesdays, at 6 p.m., commencing Jan. 12, and concluding Feb. 16. The course will be divided into two parts, which may be taken separately, though all intending students are expected to enrol on Jan. 12.

PART 1.—GENERAL (3 lectures with laboratory work):

An introduction to the metallographic study of metals and alloys, their preparation and examination. The composition and uses of various engineering alloys.

PART 2.—SPECIAL (3 lectures with laboratory work):

The microstructure and other properties of castings—iron, steel, or malleable iron.

FEE for each part (including laboratory work), 7s. 6d.

V.—EVENING LABORATORY COURSE.

Prof. COBB, Mr. HODSMAN, and Mr. SUMMERS.

The laboratory of the Department will be open on Wednesday evenings between 6 p.m. and 9 p.m. from Jan. 12 to Feb. 16, for a limited number of students who have already received some chemical training, but who desire instruction in fuel calorimetry and pyrometry. More advanced students, capable of independent work, may also be admitted to the laboratory during these periods.

The earliest possible application by intending students is requested.

FEE, 15s.

VI.—DAY LECTURE COURSES.

For information respecting the Day Lecture Courses in the Coal Gas and Fuel Industries Department of the University—namely in: Properties of gases, technology of fuel, general and non-ferrous metallurgy, iron and steel, and alloys and metallography—see the special prospectus of the Department, obtainable on application to the Registrar.

VII.—ADMISSION OF STUDENTS, INQUIRIES, &c.

Intending students are requested to send in their names without delay to the Registrar of the University, specifying at the same time what course or courses they wish to attend. Other inquiries regarding the courses should be addressed to Prof. Cobb, the Head of the Department of Coal Gas and Fuel Industries (with Metallurgy).

The University reserves the right to decide that any course shall not be given if the number of entries is inadequate.

In view of the demands on the University accommodation, the earliest possible application for admission to the Day Courses commencing in October, is advisable.

The fees for the respective courses are payable in advance on the date of the first lecture.

CO-PARTNERS AND THE PRINCIPLES OF CO-PARTNERSHIP.

Dr. Charles Carpenter's Address in the "Co-Partnership Journal" of the South Metropolitan Gas Company.

To begin with personal matters, 1926 stands out as a period when the hand of Death has been unusually busy with my supporters of the Company's co-partnership, from the Board-Room downwards. By the decease of Mr. John Mews, the Directors mourn the loss of a colleague who, thirty years ago, at a time when opinion was divided as to the desirability of making provision for the election of Employee Directors, joined the undertaking as a convinced supporter of that principle. His continued association with the Company served but to justify and deepen that conviction.

Of officials, perhaps one of the best known was Mr. F. J. Braidwood, who was for so many years an outstanding personality in all matters affecting the well-being of the employees. He was one of those superintending engineers who realize that their work is only half done when they have brought up their plant to a high degree of efficiency, and that the completion of their task requires a not less sympathetic care for the human machine, without which complete success in management is inachievable. Mr. Braidwood fulfilled these requirements with untiring zeal. There is a saying of his which comes to mind while writing, which partly explains his attitude to his work. "The hours of a gas engineer?" said he in reply to an inquirer, "Why, twenty-four hours a day, seven days a week." Only those who have to carry the burden of such responsibilities are likely to appreciate to the full his underlying meaning.

Another heavy loss was that of Mr. Metheringham. But whereas Mr. Braidwood died in the fullness of years, Mr. Metheringham's service could hardly have been expected to terminate in such an untimely way. He, too, never spared time or trouble in the fulfilment of duty as he understood the word; and the more difficult the task, the more certain that he would be found in its control and its guidance.

One more loss I feel that I must refer to by name is that of Mr. J. White, of East Greenwich, where he was a sheet anchor in every time of trouble during the evolution of that important station. His great guiding force was the co-partnership principle; and he applied it to all his own acts, as well as to his relationship with those of others.

But, it may be asked, what about the rank and file? The answer must be that, while my tasks place me less closely in direct contact therewith than was once the case, name after name has come up of those whom I knew as loyal and devoted friends, as well as employees. Here let me say that, when some unusual circumstance brings me once more in touch with the workers of to-day, I am delighted to recognize again the same old spirit of interest in their work and the desire to help thereby the welfare of the undertaking that was so much in evidence in times gone by. I knew intimately the generation of the employees which built up the strength of the co-partnership in all that it stands for to-day. Theirs is the duty to hand on to the present staff of younger men and officials those high ideals which constituted inspiration, when they took their part in the Great Achievement.

It is through the individualistic principle, and not the communistic principle, that this Company has raised up from among its employees many gifted with exceptional or unusual abilities to fill the highest and most important positions in its service. All men are not equal as regards qualities of leadership and ability; and nothing will ever make them so. But the Company's aim is to encourage their growth wherever it finds them implanted, whether in high or low places.

I heard of a man the other day who said he was not going to vote for the election of an Employee Director because he considered there were too many foremen among the candidates. A more short-sighted reason could hardly have been given. For what, after all, are foremen? Simply working men who have been blessed in a higher degree than their comrades with qualities of leadership combined with technical skill. The Employee Directors sit at the Board-Room table in order that the voice of labour may be heard at the council of management, and that it shall thereby take its share in those duties without which success in industry cannot be achieved. This position is one of representation, not delegation, as is sometimes erroneously imagined.

Is there any doubt that the tragic happenings of the last twelve months would never have materialized if every colliery company had adopted this, the cornerstone of co-partnership? I cannot but think that, if the voice of Labour could but make itself heard through channels more peace-loving than can ever be the case with a certain section of its leaders, peace in industry could be achieved with such a measure of success as seems impossible to many to-day. An electric power station next door to one of our own gas-works provided the spectacle, in the year just passed, of a large electrical undertaking being run by naval ratings because the electricians had gone on strike, while the co-partnership gas stokers worked on as usual.

Bolt Court and Dr. Johnson.

"On Monday evening about feven o'clock died at his houfe in Bolt Court, Fleet ftreet, Dr. Samuel Johnfon, in his 74th year of his age. The lofs of fo valuable a member of public and private fociety will long be felt while experience tells us he has not left a worthier character to lament his death." This was a quotation read from a newspaper known as "The London Packet," dated from Monday, Dec. 13, to Wednesday, Dec. 15, 1874, by Mr. T. Fisher Unwin last week at the Cheshire Cheese, Wine Office Court, Fleet Street, where members of the Johnson Club met to drink a silent toast on the occasion of the 142nd anniversary of Dr. Johnson's death. The paper was discovered among the records of the Olde Cheshire Cheese; and Mr. T. Fisher Unwin, who is now the Treasurer, was the first Prior of the Johnson Club.

Diminished Gas Profit at Porthcawl.—At a general meeting of the Porthcawl Ratepayers' Association—Mr. J. W. Leake presiding—it was stated that, for the year ended March, 1924, the income of the town gas undertaking was £15,014; expenditure, £14,084; and profit, £930. The accounts for last year showed an income of £14,466; expenditure, £14,444; and profit, £22. For the latter year, however, there was an additional expenditure of £370 for new mains. The Association require an explanation of the fall in profit, and it was decided to institute further inquiries.

Gas Inspection Services in Canada.—In the annual report of the Weights and Measures, Electricity, and Gas Inspection Services of the Department of Trade and Commerce of Canada, Mr. E. O. Way, the Director of Weights and Measures, states that natural gas is found mainly in Ontario and Alberta, but is also present in large quantities near Moncton, New Brunswick. During the past year over 13,000 million c.ft. of this gas were sold through 85,752 meters. Manufactured gas consisting of coal gas, carburetted water gas, and coke oven gas is sold in thirty-two different places. There were 14,427 million c.ft. supplied during the past year through 443,067 meters, which on an average represents 2712 c.ft. per meter per month. The standard for the calorific power of manufactured gas supplied by a contractor is 450 B.Th.U. per c.ft. There were 3395 calorific value tests made; and in only sixteen cases was the gas found to be below the standard. Acetylene gas is manufactured principally in Manitoba, and only on a small scale. During last year 1,210,894 c.ft. were made, and sold through 425 meters.

BUDLEIGH SALTERTON GAS INQUIRY.

Council and Gas Company.

At the offices of the Board of Trade in London on Monday, Dec. 20, Mr. J. F. RONCA (Director of Gas Administration) held an inquiry into the application of the Budleigh Salterton Gas Company for a Special Order under section 10 of the Gas Regulation Act, 1920, and also the application of the Budleigh Salterton Urban District Council for an Amending Order under section 1 (3) of the Act in respect of the Company.

Mr. A. J. Lees (Parliamentary Agent), Mr. G. E. Carpenter (Engineer, Manager, and Secretary), and Mr. R. J. Rew (Director) appeared for the Gas Company, together with Mr. George Evetts (Consulting Engineer); the Budleigh Salterton Urban District Council being represented by Mr. F. G. Hill (Clerk to the Council), and Mr. Arthur Valon (Consulting Engineer).

Mr. HILL asked for an adjournment of the Council's application for an Amending Order. The position was, he said, that since the Council had lodged its application with regard to a reduction in the standard price of the Company, the latter had been granted a temporary increase in consequence of conditions arising out of the coal strike; and the Order in respect of that temporary increase was due to run until Dec. 31, 1927. The Council did not wish to hamper the Company in any way; and in the circumstances, he suggested that the application under section 1 should be postponed.

Mr. LEES raised no objection to the suggestion, although it had been the contention of the Company that no case could be made out for a reduction of the standard price, and they were ready to meet that part of the case at any time. If the Council's application were postponed for fifteen months, accounts for 1927 would be available.

This course was subsequently agreed to.

Mr. RONCA, referring to the temporary increases which the Board had been granting in consequence of the conditions arising out of the coal strike, said he wished to make it quite clear that this did not take away the right of any local authority to make an application for an Amending Order under section 1 until the Temporary Increase Order had expired. A date limit was placed upon the Temporary Order to prevent its going on for all time; but a local authority had full rights to apply for an Amending Order in the meantime, in the ordinary way, as if the Temporary Increase Order did not exist.

Mr. LEES, dealing with the Company's application, said they were working under an Order granted in 1898, authorizing them to supply gas throughout the parish of Budleigh Salterton, with a capital of £13,000. As for the borrowing powers, these were limited to one-quarter of the amount of capital paid up. The dividends authorized were 10 p.ct. on the original, and 7 p.ct. on the additional capital. At the moment the whole of the ordinary capital had been issued, and only £150 remained of the loan capital. The Company were overspent to the extent of £256, and there was owing to the bankers £778; so that there was a matter of £1000 required to adjust the accounts. In the present Order, power was asked to raise a further £7000 of ordinary share capital, with half borrowing powers in respect of the capital paid up at the time. The other main proposal of the Order was to extend the area of supply by including the parish of East Budleigh and Otterton, both of which districts it was suggested were ripe for a gas supply. It was also proposed that there should be an optional 3d. differential price in the case of these two parishes. The Council suggested that the differential should be compulsory; and, though the Company did not seriously object, they did wish to point out that this was hardly the way to develop the supply of gas. Then the Council suggested that the new loan capital should bear interest at a maximum rate of 6 p.ct., instead of the 7 p.ct. proposed by the Company. In regard to this point, the Burnham Gas Company had recently to go to the Board of Trade for sanction to pay a higher rate than they were authorized to do, and this was a difficulty with small companies. Other points raised by the Council were with regard to their consent to the position of mains in streets, and also in regard to a proviso to a clause in the original Order, which stated that in the case of slot meters the consumers should not be liable for any loss sustained by the Company through defective readings. As 99 p.ct. of the meters were slot meters, this practically made the clause—which was the model clause relating to period of error in defective meters—inoperative. A question was also raised by the Council concerning payment of back-dividends.

Mr. *George Evetts* gave evidence on behalf of the Company, and said his estimate of the capital requirements during the next eleven or twelve years would be £13,880, as against the £13,750 asked for in the Order. The total sum included £1200 working capital to replace the existing temporary bank overdraft. The estimate of capital required was based on an annual increase in the sale of gas of about a million c.ft. In 1925, the sale was approximately 17·2 millions, with a capital expenditure of about £16,355, or £952 per million. Most of this was developed in pre-war days; and therefore the new capital expenditure must be expected to be higher. He calculated that the additional 12 million c.ft. for the period he had taken would cost £1150 per million, seeing that part of the sum to be expended was in relation to extensions into rural districts. Before the end of the period, expenditure would have to be incurred in the direction of increased storage, because the holder capacity would only be 68 p.ct. of the maximum day under the scheme. Nothing had been included in the estimate, however, on this account. So far as the differential was concerned, if East Budleigh were taken by itself, he had calculated that at first it would require 4·4d. per therm to meet the actual position, and 6d. per therm would be needed in the case of Otterton; but there would be considerable development along the same mains close to the existing boundary, which in the ordinary way would not call for any differential at all—or at any rate a smaller one—and he believed an over-all figure of 3d. would repay the Company. The difficulty in making the differential compulsory was that the Company would be obliged to charge it to consumers close to the existing boundary.

Mr. LEES then explained that the Company, like many others, had misconstrued their powers, and had paid, in 1925, the full dividend on the 7 p.ct. shares, and only 8½ p.ct. on the 10 p.ct. shares. According to the law, a proportionately less dividend should have been paid upon the 7 p.ct. shares; and the contention of the Council was that the Company had paid more in dividends in the case of 7 p.ct. shares than they were entitled to, to the detriment of the consumers. In consequence, they asked that provision should be made preventing the payment of back-dividends upon those shares which had not received the full dividend in past years. However, had the Company paid more on the 10 p.ct. shares (though not the full 10 p.ct.), and a proportionate reduction in the case of the 7 p.ct. shares, it would simply have meant that both classes of shareholders would have had a claim for back-dividends, and the final result would have been the same. The consumer was not hurt; it was only a question of adjustment as between the two classes of shareholders.

Mr. *Evetts* pointed out that since 1920 the Company had paid £2250 less in dividends than the maximum, so that the consumer did not appear to have been much hurt.

Mr. HILL cross-examined on the various details raised, but informed the Director that the Council did not oppose the extension of area. What they wanted to prevent was a loss in these areas being placed upon the consumers in Budleigh Salterton. He put it that the districts were essentially working-class districts, with very few houses, and that the prospects for a long time ahead were extremely poor.

Mr. *Evetts* said he was aware of the nature of the districts; but even working-class people used gas. The districts were obviously developing, and this was the reason why the Company wished to go there. Provision had been made in the estimates for 3-in. high-pressure mains, and 3-in. and 4-in. low-pressure mains in both districts.

Mr. HILL, after discussion, said the Council would agree to an optional 3d. differential for half a mile beyond the present area of supply; but they asked for a compulsory differential for the remainder of the new area on the basis of the figures mentioned by Mr. Evetts, which would be more than 3d. Proceeding, he said that, on the point regarding defective meters, this was a protection to the public against default of the Company in maintaining their meters.

Mr. *Arthur Valon* then gave evidence, for the Council, on the undeveloped nature of the proposed areas.

Mr. RONCA said this kind of argument did not appeal to him, because any gas company must take a district before it was immediately ready for full development. The Company could not wait until the area had been fully built over.

Mr. *Valon* also discussed at some length the position in regard to the payment of back-dividends. In the course of his evidence, there was an agreement between the parties that the new loan capital should be raised at 6½ p.ct., with power to apply to the Board of Trade for an increase, should conditions warrant.

As to the claim of the Council to have a voice as to where mains should be laid, it was explained that most of the roads in Budleigh Salterton belong to Lord Clinton, with whom the Company arrange the position of their mains.

Mr. LEES protested against the Council coming into these discussions, and asked where the Company would be if the Council and Lord Clinton's agents disagreed.

Mr. HILL said the matter would then have to be settled by the Justices.

Mr. *Valon* admitted that he knew of no other case in which the proviso regarding defective meters now appearing in the Budleigh Salterton Order of 1898 was to be found; nor did he know of any Provisional Orders or Special Orders which contained a clause giving the local authority a voice in the laying of mains where the local authority did not own the roads. There were precedents, however, in the case of Acts.

INCREASES IN THE PRICE OF GAS.

The Clitheroe Town Council on Dec. 22 considered a resolution of the Gas Committee that the price be increased by 8d. per 1000 c.ft. After discussion, an amendment that the increase be 6d. per 1000 c.ft. was carried by the casting vote of the Mayor. The Manager (Mr. R. Barrett) said that, since the Committee decided on an increase of 8d., coal contracts had expired, and they would be involved in 3s. per ton advance, equivalent to 3d. per 1000 c.ft. The suggested increase was designed to spread the repayment of losses over two years. On the new basis, the price will be 11·6d. per therm.

The price at Hathersage has been increased, by 1s. per 1000 c.ft., to 8s. 1d. per 1000 c.ft.

The Matlock and District Gas Company have increased the price by 6d. per 1000 c.ft., bringing it to 5s. 11d. per 1000 c.ft.

The St. Ives (Cornwall) Town Council have decided that the price for the quarter ending March 31 next shall be increased to 1s. 6d. a therm or 6s. 0½d. per 1000 c.ft., and that for the quarter ending June 30 next shall be reduced to 1s. 5d. a therm, or 6s. 6d. per 1000 c.ft.

In consequence of an extra expenditure of over £1000 through the purchase of foreign coal, the Totnes Gas Company have increased the price of gas by 6d. per 1000 c.ft.

CALENDARS, POCKET BOOKS, &c.

"With the compliments of the season and best wishes for the New Year," the Staveley Coal and Iron Company, Ltd., have sent us an excellent pocket book, with a useful case for the cover; the pocket book is in two sections—one giving much valuable information for engineers, with spare pages for notes; and the other is the diary. A self-opening tab is provided for sundry notes.

A handy sized pocket book comes from the Gas Meter Company, Ltd. Preceding the diary are data as to the new standard sizes of dry meter and prepayment meter, comparisons of the price of gas per 1000 c.ft. and per therm, and other useful information. The diary pages are side lettered with the months, so that any one can be quickly consulted. Following the diary are lettered pages for memoranda.

A bound desk calendar has been forwarded by Messrs. Alder & Mackay, Ltd. Among the information preceding the diary is a useful table showing prices of gas at per 1000 c.ft., and the corresponding settings of penny and shilling prepayment meters. The diary pages contain the six working days of the week, and give plenty of scope for notes. The firm hope the pages will record "a brighter and more profitable year than its unfortunate predecessor."

Printed on excellent paper and strongly bound, Roneo, Ltd., send a copy of their indexed diary. For ready reference, the months are printed on projecting tabs, and the dates are also exposed. For the desk and ready reference, it is a very convenient arrangement—particularly for any one with numerous engagements, and desirous of keeping a permanent record of them.

Messrs. Brotherton & Co., Ltd., of City Chambers, Leeds, the well-known tar distillers, have forwarded their desk stand refill for 1927. The dates are boldly printed, and on the bottom card is the complete calendar for the year.

NORTH-EAST COAST COAL TRADE.

From our Own Correspondent.

There has been hardly any change in the situation during the past short week, and shippers have had little of the usual difficulty in completing cargoes to sail before the holiday. There has been plenty of prompt coal available; boat arrivals having been irregular, and wagon shortage still acute.

The volume of new trade is very disappointing, and buyers seem reluctant to close for forward contracts. The likely tendency of prices certainly appears downward, and buyers are no doubt holding off for this reason, though collieries are still counting on the much-discussed general industrial revival to stimulate demand.

Northumberland steams are reported fairly firm; but Durham makes are unsteady. Nominal quotations for special and best gas qualities are about 22s. to 23s. f.o.b.; but cargoes are being sold for early next year at considerable reductions on these figures. Second-class gas is weak, and nominally 19s. Unscreened coking is quoted at 19s. to 20s.

Gas coke is quoted 32s. 6d., and is in good supply.

YORKSHIRE AND LANCASHIRE COAL TRADE.

From our Local Correspondent.

There is a decided shortage of house coal at present, due probably to a lack of empty wagons, owing to blocks on the railways. With the public buying in limited quantities, there is a feeling in the trade that the next few weeks will bring about a decided alteration.

Industries are not yet working freely, and some of the lower grade qualities of coal are not in urgent request.

Gas undertakings are in a comfortable position. A larger tonnage of gas coal is being readily taken, and there is steady progress in regard to the renewal of contracts over next year. Values for these vary from 19s. to 20s. per ton for best grades.

For best house coal 30s. to 35s. per ton is quoted, and 28s. to 30s. for secondary grades. There has been little development of trade for large steam coal. Values are easier, and best hards are quoted at 24s. 6d. to 25s. per ton f.o.b., and secondary sorts 1s. to 1s. 6d. per ton less. Washed doubles are 25s. to 26s., singles 24s. to 25s., and smalls 18s. 6d. to 19s. per ton f.o.b.

COAL TRADE IN THE MIDLANDS.

From Our Local Correspondent.

The holidays found good supplies of fuel in the distributive channels, and householders were not disposed to buy more than would suffice for immediate requirements. Industrialists postponed negotiations for January deliveries in the hope that prices would be easier. There was little indication, however, of further wavering in pit-head quotations. With few exceptions the output has been regularly absorbed, if it has not all gone into consumption.

Manufacturers can now get any grade of fuel they require. Apart from the reluctance to accumulate the reserves which are ordinarily carried, the trade is rapidly resuming its normal routine.

Blast furnacemen have striven hard to break down the new coke basis of 20s. at ovens. They cannot postpone the blowing-in of furnaces indefinitely, however, and sufficient supplies have been arranged to enable more pig iron to be produced in this district. The 20s. basis is adhered to, but in the case of most smelters it will be offset by deliveries against contracts made in the spring at between 14s. and 16s.

Gas coal can be bought at prices round about 21s. The volume of business is not very great, however, as most of the undertakings are now getting in the arrears of contracts entered into before the stoppage.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Dec.* 24.

Business in tar products is quiet on account of the holidays. There is little being done in pitch, and in the absence of demand the price is nominal.

Creosote is firm and steady at not below 9¼d. per gallon in bulk.

Pure benzole and pure toluole are in demand, and the prices are firm at about 2s. 6d. to 2s. 7d. per gallon respectively. Solvent naphtha, 95/160, is quiet at about 2s. per gallon.

Tar Products in the Provinces.

Dec. 24.

The average values for gas-works products during the week were: Gas-works tar, 88s. 6d. to 93s. 6d. Pitch, East Coast, 120s. to 125s. f.o.b. West Coast—Manchester, 112s. 6d. to 117s. 6d.; Liverpool, 115s. to 120s.; Clyde, 117s. 6d. to 122s. 6d. Benzole, 90 p.ct., North, 1s. 11d. to 2s.; crude, 65 p.ct. at 120° C., 1s. 4d. to 1s. 5d., naked at makers' works; 50-90 p.ct. naked, North, 1s. 11d. to 2s. Toluole, naked, North, 1s. 11d. to 2s. nominal. Coal-tar crude naphtha, in bulk, 9d. to 9¼d. Solvent naphtha, naked, North, 1s. 9d. to 1s. 10d. Heavy naphtha, North, 1s. 1d. to 1s. 2d. Creosote, in bulk, North, liquid, 8¾d. to 9d.; salty, 8d. to 8¼d.; Scotland, 7¾d. to 8¼d. Heavy oils, in bulk, North, 7¼d. to 7¾d. Carbolic acid, 60 p.ct., 1s. 9½d. to 1s. 10½d. prompt. Naphthalene, £11 to £14; salts, 90s. to 100s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

TRADE NOTES.

Wire Rope for Cranes.

Messrs. Brunton's Wire Rope Works, of Musselburgh, have published a booklet on "Wire Rope for Cranes," in which they have given the actual breaking strain guaranteed on each size and construction of rope, and what they consider to be the proper working load. The booklet will be sent to any of our readers if they apply to the firm.

Distance Thermometers.

Indications of temperature may be transmitted considerable distances if suitable apparatus is employed; but the convenience and value of distance themometers is greatly discounted if their use introduces serious inaccuracies in measurement. Realizing that the accuracy and reliability of many forms of distance thermometer were far below that of the standard mercury-in-glass thermometer, Messrs. Negretti & Zambra resolved to investigate every possible source of error in order to arrive at a satisfactory basis for a new design. The results of these researches are embodied in the Negretti & Zambra mercury-in-steel thermometer, for which is claimed a standard of performance which renders it suitable for purposes for which previous distance thermometers were unfitted. In a new bulletin entitled "Notes on Distance Thermometers," Messrs. Negretti & Zambra set forth in a clear and interesting manner the principle of the mercury-in-steel thermometer, discuss in detail the possible sources of error, and show how these errors have been eliminated in their instruments. The booklet, which is profusely illustrated with photographs and diagrams, concludes with a description of the constructional features of these thermometers. The firm intimate that they will gladly send a copy of the bulletin to those interested in thermometry, upon receipt of a postcard.

CONTRACTS OPEN.

Station Governor, &c.

The Dewsbury Corporation are inviting tenders for the supply and fixing of a 24-in. station governor. [See advert. on p. 835.]

Meters, Cookers, and Stoves.

Tenders are invited by the Gas Committee of the Belfast Corporation for the supply of gas meters, cookers, heating stoves, &c. [See advert. on p. 835.]

Peace—Industrial and International.

The annual dinner of Messrs. Arthur Duckham (1920), Ltd., was held at the Trocadero Restaurant on Dec. 23. The Chairman of the Company (Sir Arthur Duckham, K.C.B.) presided, and there were present over 180 members of the staff. After proposing the Loyal Toasts, Sir Arthur said that there was one further toast which he would like to give the company—namely, "Peace—International and Industrial." He felt that the prosperity of the country, and, indeed, the Company collectively and individually, depended upon the general acceptance of international peace and peace in industry. Subsequently, Sir Arthur took the opportunity of congratulating the staff upon having brought to commercial success a number of important developments upon which they had been engaged during the past few years.

Killamarsh Gas Light and Coke Company.—A satisfactory report, considering the effects of the miners' dispute, was presented by the Directors of the Killamarsh Gas Light and Coke Company to the shareholders at the annual meeting on Dec. 20. The balance-sheet for the year ended September last showed a profit of £307, which, with £1092 brought forward, made a total of £1399. The dividend declared was 8 p.ct., free of income-tax, absorbing £400; and the balance of £999 was carried forward.

Acknowledgments at Middlesbrough.—The Middlesbrough Corporation Gas Committee have placed on record their appreciation of the skill and assiduity with which the Gas Manager (Mr. C. F. Blincoe) maintained the gas supply of the town during the coal stoppage.

Reduction in Price at South Shields.—The Directors of the South Shields Gas Company intimate that the price of gas will be reduced to 10·6d. per therm for the inside area and 11·4d. per therm for supplies in the outside districts—both to take effect after the December quarter meter readings.

Results at Bilston.—In their annual report, the Directors of the Bilston Gas Light and Coke Company state that the profit and loss account shows a credit balance of £14,828. It is proposed to pay dividends of 5s. 6d. per share on the "A" shares, and 4s. per share on the "B" shares, making 11s. and 8s. per share respectively, less tax, for the year. This will leave a balance of £12,680. During the coal strike, the Directors supplied an increased amount of gas, and they have not raised the price.

Imperial College of Science and Technology.—The annual dinner took place at the Hotel Cecil on Monday, Dec. 13, when Sir Thomas H. Holland (Rector of the College), who was accompanied by Lady Holland, presided over a large company. Sir Alfred Mond, in proposing the "Imperial College," said that the College was originally intended to be a kind of Charlottenberg—a school not only of pure science, but also of technology. He was glad to know that it had about 1000 students, and no fewer than 245 post-graduates working on research. The work of the College was proving of the highest value to industry.

Tribute to the Engineer and Manager at Devizes.—At a recent meeting of the Devizes Urban Council, the Gas Committee placed on record their appreciation of the foresight of the Engineer and Manager (Mr. W. J. Rendell-Baker) in having a good stock of coal on hand at the commencement of the strike, and of the businesslike and careful manner in which purchases of coal were made by him during that period. Mr. Rendell-Baker was also thanked for the very satisfactory manner in which Devizes was supplied by gas for all purposes throughout the strike period, and also for the fact that, at the termination of the dispute, only a small quantity of high-priced coal remained on hand.

St. Ives Gas-Works Fire.—A fire occurred at the gas-works at St. Ives (Cornwall) on Wednesday night, Dec. 22. It broke out in the purifier house, and was discovered by one of the workmen. The entire staff immediately set about fighting the flames, under the supervision of the Manager (Mr. F. R. Grant), and the fire brigade was summoned. After two hours' strenuous work, the situation was well in hand; but considerable damage had been done. The roof of the purifier house was destroyed; but the remainder of the building was intact, and it was possible to continue the manufacture of gas the following day. The cause of the outbreak is at present a mystery; but an inquiry is being held into the circumstances.

Dunmow Gas Company, Ltd.—In their annual report, the Directors stated that the profit on the year's working amounted to £803, out of which they recommended the declaration of a dividend at the rate of 7½ p.ct., less income-tax. An increase in the gas sold was again recorded, while the working results had been satisfactorily maintained. Owing to the continued increase in the Company's business, considerable extensions had been made at the works; a new retort house and modern carbonizing plant having been erected. The Directors of the Company offer 322 ordinary shares of £10 each, at par. They state that for several years a dividend of 7½ p.ct. has been paid, and that prospects are exceedingly good.

London County Council and the Price of Gas.—At a meeting of the London County Council, on Dec. 21, replying to a question by Mr. J. P. Blake as to whether other Gas Companies in the County of London area were likely to follow the example of the South Metropolitan Company, which had announced a reduction of ¼d. per therm, Mr. Cyril Jacobs (Chairman of the Public Control Committee) said that, while he had no information on the point, no doubt when the present and contract supplies of coal were exhausted, the Companies would consider the possibility of reduction. It was only fair to say that the increase of price by the Company in the current year had been greater than that of any other London company.

Stocktaking at Bridgnorth.—The report of the chartered accountants on their audit of the Corporation accounts was laid before Bridgnorth Town Council a few days ago. In reference to the Gas Department, the Auditors said they had to call attention in their last report to the fact that the stock was not taken, and the actual figure used was the balance standing in the stock ledger. This year the stock had been taken, and the result proved that they were now obliged to debit the revenue account with £224, the actual deficiency on the stock, fittings, &c. If the stocks were periodically and properly supervised, it should be impossible for such a figure to arise. They understood that there was not a complete register of all the Corporation meters and cookers, and they were of opinion that, if one had not been started, steps should be taken to remedy the defect at once. The Gas Committee reported that they were considering the above report; and, as neither the Committee nor the Manager could agree with the stocktaking figures, a Sub-Committee had been appointed to go into the details, and to arrange for a stocktaking on Dec. 31.

After the close of the year, the London Office of the Barrowfield Iron-Works, Ltd., will be 25, Victoria Street, S.W. 1.

The Bakewell Urban Council have decided to make application to the Ministry of Health for sanction to borrow £1000 for working expenses of the gas undertaking.

Over 200 dancers were present at the Plymouth Corporation Gas-Works Sports Club's first carnival of the season, in Exmouth Hall, Devonport. Mr. J. Clifford Tozer (the Chairman of the Gas Committee) presented the prizes.

Among the minutes confirmed by the Poulton-le-Fylde District Council, on Dec. 22, was one reading: "That an Advisory Committee be appointed to consider matters in the Gas Manager's report, and that they have power to engage an expert to assist, if necessary."

At the annual meeting of the Accrington Gas Board, Mr. A. J. Harrison (the General Manager) told a questioner that the Board's contractors were supplying coal as from Dec. 1 at contract rates. Supplies were not coming forward freely; but he understood this was due to the difficulty regarding wagons.

Nearly eight hundred employees of the "Ironclad" Gas Mantle Factory at Earlsfield, S.W., and their friends, attended a fancy dress carnival dance on Monday, Dec. 20, at the Wimbledon Palais de Danse. It was practically a non-stop evening, dancing being continuous from 7.30 to 11.30, with short breathing spaces while a fancy dress parade was held. The winners of this event and the holders of numerous mystery number tickets received their prizes from Mrs. Mitchell, the wife of Mr. H. J. Mitchell, Chairman of Lighting Trades, Ltd. Perhaps the biggest "draw" of the evening was for two Sunbeam cycles, presented by Nobel Industries, Ltd.; the lucky winners being Miss Pike and Miss Roath, both of the Earlsfield Factory.

NEW PUBLICATIONS.

"GAS JOURNAL" CALENDAR AND DIRECTORY FOR 1927.

(See further particulars on p. 796.)

Price ***7/6*** *post free.*

COMPETITION POINTS FOR GAS SALESMEN.

Price ***7/6*** *post free.*

GAS SALESMAN'S DIARY AND HANDBOOK FOR 1927.

Price ***3/6*** *post free.*

LONDON: WALTER KING, LTD., 11, BOLT COURT, FLEET STREET, E.C. 4.

STOCK MARKET REPORT.

As was expected the past week was an uneventful one on the Stock Exchange, but prices in most markets displayed a firm tone. The Gilt-edged section was particularly strong; the 5 p.ct. War Loan closing at 100⅝, the 4½ p.ct. Conversion Loan at 94½, and the 3½ p.ct. finishing at 74⅞. The Home Railway Market was deserted, but prices remained steady. In the Industrial group, Tobaccos found favour; British American closing on Friday at 99s. 6d., and Imperials at 118s.

The Nottingham £1,000,000 5 p.ct. loan was even more successful than had been anticipated; and it is interesting to note that only applicants for £50 stock are receiving allotment in full, while applications for over £1000 have been ruled out. Dealings commenced on Friday, and after opening at ¼ premium, improved at the close to ⅜ premium. An official announcement has been made of an agreement which has been entered into for the amalgamation of the two great brewing firms, Messrs. Bass, Ratcliff, & Gretton, Ltd., and Worthington & Co., Ltd. This agreement is provisional only and subject to ratification by the ordinary shareholders, and, if confirmed, will take effect as from Jan. 1. The announcement brought about an immediate rise of 3s. 6d. in the shares of the former concern.

There were further signs of a general improvement in the Gas Market last week. In spite of the proximity of the holidays, the number of transactions was well up to the average. As will be seen by the Table, the stocks and shares of no less than eight companies showed increases in price. A noticeable feature of the past few weeks has been the improvement in the price of the Commercial Company's two stocks. The 4 p.ct. stock is now quoted at 79-82, and sales have taken place at 81; the 3½ p.ct. stock, which quite recently was sold at 74½, is quoted at 78-81, and transactions have touched 80. The Company is presenting a Bill in Parliament next Session, and is asking for powers similar to those obtained by the South Metropolitan Company. No additional capital is required. The Gas Light and Coke and South Metropolitan Companies also showed further improvements.

The following transactions were recorded during the week:

On Monday, Alliance and Dublin 82⅝, Brighton and Hove "A" 128½, British 106, Colombo 28s. 3d., 28s. 9d., Commercial 4 p.ct. 79, 3½ p.ct. 77½, Gas Light and Coke 85⅝, 85⅞, 86, 86¼, 86½, 3 p.ct. debenture 58½, Imperial Continental 120½, 130, Newcastle 3½ p.ct. debenture 65, Primitiva 13s. 6d., 13s. 7½d., 13s. 8¼d., 13s. 9d., South Metropolitan 94, 95, 6½ p.ct. debenture 102, South Suburban 5 p.ct. 98¼, 5 p.ct. debenture 94. Supplementary prices, Bournemouth new 6 p.ct. preference fully paid 11¼, Luton "A" (£10) 20½, (£5) 10¼, 4 p.ct. preference "B" 55s., 5 p.ct. "C" 70s.

On Tuesday, Bombay 21s., Brighton "A" 128¾, 128⅞, 129, Cardiff 98¼, Commercial 3½ p.ct. 77½, 3 p.ct. debenture 56¼, Continental Union 29½, European 6¼, Gas Light and Coke 85⅜, 86⅛, 86¼, 3½ p.ct. maximum 59½, 4 p.ct. preference 76½, 76¼, 76⅜, Imperial Continental 120¼, Newcastle 3½ p.ct. debenture 67, Primitiva 13s. 6d., 13s. 6¾d., South Metropolitan 94½, South Suburban 5 p.ct. debenture 95, Tottenham 3½ p.ct. 90½, 91. Supplementary prices, Reading 5 p.ct. 88½.

On Wednesday, Gas Light and Coke 85⅛, 86¼, 86½, 4 p.ct. preference 76, 3 p.ct. debenture 58½, 59, 6 p.ct. debenture 103½, Hong Kong and China 15⅛, Imperial Continental 129½, Primitiva 13s. 6d., 13s. 7¼d., South Metropolitan 94⅜, 3 p.ct. debenture 58½.

On Thursday, Commercial 4 p.ct. 81, 3½ p.ct. 80, Gas Light and Coke 86⅛, 86½, 3½ p.ct. 50½, 60½, 6 p.ct. debenture 102½, 102⅜, Hong Kong and China 15, Imperial Continental 131, Primitiva 13s. 9d., 13s. 10¼d., 14s., South Metropolitan 3 p.ct. debenture 58, South Suburban 5 p.ct. 98⅛, Wandsworth, Wimbledon 5 p.ct. 101½.

On Friday, Bombay 21s. 1⅛d., Commercial 4 p.ct. 80, Gas Light 86, 86⅛, 86⅜, Primitiva 13s. 7¼d., 13s. 9d., 14s., 14s. 1¼d., 14s. 3d., South Metropolitan 94¼, 94⅜, 6½ p.ct. debenture 102.

As was expected there was some heavy borrowing at the Bank of England on Christmas Eve into the New Year. Loanable cash was in ample supply; and while the clearing banks adhered to 4 p.ct. for renewing day-to-day advances, other lenders lowered their rate to 3⅜ p.ct. Discount rates were unaltered. Treasury Bills to the amount of £45,000,000 were tendered for, the average rate being £4 13s. 0·94d. p.ct., as compared with £4 12s. 8·86d. p.ct. the previous week.

The Foreign Exchange Market was quiet. Sterling on New York appreciated, and closed at 4.85 5/16. French francs moved within narrow limits, and closed at 122.45. Belgas were quoted at 34.89. Italian lire were a shade better at 107⅜.

Silver in the absence of business declined further to 24 11/16d. per oz. Sales of gold were made to Germany; but there was no change in the price, which remained at the nominal rate of 84s. 11½d. per oz.

The Bank Rate is 5 p.ct., to which it was raised from 4 p.ct. on Dec. 3, 1925. Bankers' deposit rates at 3 p.ct. The deposit rates of the discount houses are 3 p.ct. at call and 3¼ p.ct. at notice.

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf.Yr	Dividends. Last Hf. Yr.	NAME.	Quotations. Dec. 24.	Rise or Fall on week.	Transactions Lowest and Highest Prices.
£			%p.a.	% p.a.				
171,978	Stk.	Aug. 12	5	5	Aldershot 5 p.c. max. C.	72—75	..	
222,992	,,	,,	4	4	Do. 4 p.c. Pref.	67—72	..	
1,561,868	,,	Sept. 30	6¼	6¼	Alliance & Dublin Ord.	81—86	+2	..
374,000	,,	July 8	4	4	Do. 4 p.c. Deb.	67—70	..	82⅝
300,000	1	Oct. 14	1/7½	1/7½	Bombay, Ltd.	1—1½	..	..
170,000	10	Aug. 26	8½	8½	Bournemouth 5 p.c.	12—13	..	21/—21/1½
600,050	10	,,	7	7	Do. B 7 p.c.	12—13	..	..
275,000	10	,,	6	6	Do. Pref. 6 p.c.	11—12	..	..
50,000	Stk.	June 24	3	3	Do. 3 p.c. Deb.	54—57	..	..
182,025	,,	,,	4	4	Do. 4 p.c. Deb.	74—77	..	..
214,740	,,	Aug. 26	12	12	Brighton & Hove Orig.	163—168	..	..
244,200	,,	,,	9	9	Do. A Ord.	125—130	..	..
1,887,500	,,	July 22	5	5	Bristol 5 p.c. max.	84½—85½a	..	128½—129
865,000	,,	Sept. 30	7	8	British Ord.	102—107	..	..
100,000	,,	June 24	7	7	Do. 7 p.c. Pref.	114—119	..	106
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb.	68—73	..	..
100,000	10	Dec. 9	8	6	Cape Town, Ltd.	7—8*	..	..
100,000	10	Oct. 28	4½	4½	Do. 4½ p.c. Pref.	6—7	..	..
150,000	Stk.	June 24	4½	4½	Do. 4½ p.c. Deb.	68—73	..	..
695,860	,,	July 22	6	6	Cardiff Con. Ord.	97—100	+1	98¼
357,860	,,	June 24	7½	7½	Do. 7½ p.c. Red. Deb.	100—103	+1	..
157,150	,,	Aug. 12	6½	5	Chester 5 p.c. Ord.	89—94b	..	..
73,185	1	Sept. 30	½/-	½/-	Colombo Ltd. Ord.	27/—29/-	..	28/8—28/9
24,495	1	,,	1/4½	1/4½	Do. 7 p.c. Pref.	20/—22/-	..	..
321,490	1	Oct. 14	1/9½	1/7½	Colonial Gas Assn. Ld. Ord.	25/—27/-	..	..
173,900	1	,,	1/9½	1/7½	Do. 8 p.c. Pref.	21/—23/-	..	..
1,818,380	Stk.	Aug. 1	5½	5½	Commercial 4 p.c. Cap.	79—82	+1	79—81
560,000	,,	,,	5/8¼	5/8¼	Do. 3½ p.c. Cap.	78—81	+2	77½—80
475,000	,,	June 24	3	3	Do 3 p.c. Deb.	55—58	..	..
800,000	,,	Sept. 30	½	½	Continental Union, Ltd.	27—32	..	56½
200,000	,,	,,	1	1	Do. 7 p.c. Pref.	82—86	..	29½
737,150	,,	Aug. 12	7	7	Croydon sliding scale	96—99	..	..
408,100	,,	,,	6½	6¼	Do. max. div.	78—81	..	..
492,270	,,	Aug. 26	5	5	Derby Con.	107—109e	..	..
55,000	,,	June 24	9	6	Do. Deb.	73—75e	..	..
309,000	,,	Sept. 16	4	4	East Hull Ord. 5 p.c.	78—82	..	..
50,000	,,	June 24	†4	5	Eastbourne 5 p.c. Deb.	91—96	..	..
1,002,180	,,	Sept. 30	5	5	European, Ltd.	6¼—7½	..	..
18,788,960	Stk.	Aug. 12	†8	5/1/4	Gas Light & Coke 4 p.c. Ord.	85—87	..	6½
2,600,000	,,	,,	4/17/4	4/17/4	Do. 3½ p.c. max.	58—61	+½	85⅛—86⅜
4,167,020	,,	,,	3½	3½	Do. 4 p.c. Con. Pref.	74—77	..	59¼—60¼
5,602,620	,,	,,	4	4	Do. 3 p.c. Con. Deb.	58—61	..	76—76⅝
181,315	,,	June 24	3	3	Do. 6 p.c. Br'sf'd Rd. Db.	100—105	..	58—58¼
180,000	,,	,,	—	6	Do. 10 p.c. Bonds.	..	..	102¼—103¼
42,000	,,	—	10	10	Do. 7½ p.c. Ilford Deb.	..	..	..
82,500	,,	,,	7½	7½	Hastings & St L. 5 p.c. Conv	87—92	..	..
258,740	,,	Aug. 26	6½	6½	Do. 3½ p.c. Conv.	66—71	..	..
70,000	10	Oct. 14	5½	5½	Hongkong & China, Ltd.	14½—15½	..	..
173,200	Stk.	Sept. 16	†10	†10	Hornsey Con. 3½ p.c.	69—71	..	15—15½
1,976,000	,,	Nov. 11	5	5	Imperial Continental Cap.	129—132	..	..
226,170	,,	Aug. 12	†10	10	Do. 3½ p.c. Red. Deb.	68—71	..	129½—131
235,242	,,	Aug. 12	3½	3½	Lea Bridge 5 p.c. Ord.	94—99	..	..
2,127,340	,,	Aug. 12	6¼	6¼	Liverpool 5 p.c. Ord.	79½—80½b	..	..
600,000	,,	Aug. 12	5½	5½	Do. 7 p.c. Red. Pref.	102—105b	..	..
165,736	,,	Sept. 30	7	7	Maidstone 5 p.c. Cap.	113—117	..	..
63,480	,,	Aug. 26	8	9	Do. 3 p.c. Deb.	53—58	..	..
75,000	,,	June 24	3	3	Malta & Mediterranean	5½—5¾*	..	..
541,920	5	Dec. 9	†7	†7	Montevideo, Ltd.	70—82	..	..
2,061,315	Stk.	Nov. 25	†6	†5	Newcastle & Gateshead Con.	71½—72½d	..	..
360,929	,,	Aug. 12	5	5	Do. 4 p.c. Pref.	73—74d	..	..
529,705	,,	,,	4	4	Do. 3½ p.c. Deb.	68¾—69½d	..	..
15,000	,,	June 24	3½	3½	North Middlesex 10 p.c.	155—160	..	..
91,580	,,	Aug. 26	11½	11½	Do. 7 p.c.	109—114	..	..
300,000	,,	,,	8⅛	8⅛	Oriental, Ltd.	97—102	..	..
188,120	,,	Nov. 25	7	9	Plym'th & Ston'house 5 p.c.	108—113	..	..
414,500	,,	June 24	7¼	7¼	Portsm'th Con. Stk. 4p.c. Std.	102—107	..	..
236,732	,,	Aug. 26	—	7/4/0	Do. 5 p.c. max.	78—81	..	..
2,289,909	1	,,	—	5/0/0	Primitiva Ord.	13/6—14/6	+/6	18/6—14/3
282,200	100	Dec. 1	—	—	Do. 4 p.c. Red. Deb.	84—86	..	..
600,000	Stk.	July 22	4	4	Do. 4 p.c. Red. Deb. 1911	70—72	..	..
434,963	,,	,,	4	4	Do. 4 p.c. Cons. Deb.	70—72	..	..
150,000	10	—	—	—	San Paulo 6 p.c. Pref.	7⅞—8	..	..
125,000	50	Sept. 30	6	6	Do. 5 p.c. Red. Deb.	46—49	..	..
270,000	Stk.	July 1	5	5	Sheffield A	96—98e	..	..
419,968	,,	Sept. 16	6	5½	Do. B	96—98e	..	..
1,047,000	,,	,,	6	5½	Do. C	96—98e	..	..
90,000	10	,,	6	5½	South African	4—6	..	..
6,609,895	Stk.	June 11	4	—	South Met. Ord.	93½—95½	..	..
1,895,445	,,	Aug. 12	7	5	Do. 3 p.c. Deb.	57—60	+½	94—95
734,000	,,	July 8	3	3	Do. 6½ p.c. Red. Db.	100—103	..	58—58½
91,500	,,	Sept. 16	8½	8	South Shields Con.	114—116d	..	102
1,187,795	,,	Aug. 12	8½	6½	South Suburban Ord. 5 p.c.	96—99	..	..
368,837	,,	Aug. 12	8½	8½	Do. 5 p.c. Deb.	93—96	..	98½—98⅝
647,740	,,	June 24	6	6	South'mpton Ord. 5 p.c. max.	75—78	+1	94—95
121,275	,,	Oct. 14	5	5	Do. 4 p.c. Deb.	68—73	..	..
250,000	,,	June 24	5	5	Swansea 7 p.c. Red. Pref.	100—102	..	..
300,000	,,	Aug. 26	4	4	Do. 6½ p.c. Red. Deb.	100—102	..	..
120,000	,,	June 24	7	7	Tottenham District A 5 p.c.	105—110	..	..
882,275	,,	July 22	6½	6½	Do. B 3½ p.c.	88—91	..	..
150,000	,,	,,	7½	7½	Do. 5½ p.c. Pref.	99—101	..	90½—91
161,256	,,	,,	5½	5½	Do. 4 p.c. Deb.	72—75*	..	..
358,251	,,	Dec. 9	4	4	Tynemouth Con. and New	69½—70½d	..	..
	,,	Aug. 26	5	5	Uxbridge, Maidenhead, & Wycombe 5 p.c.	85—90	..	..
197,294					Do. 5 p.c. pref.	80—85	..	..
88,350	,,	Aug. 26	6⅝	6½	Do. 5 p.c. Maidenh'd	85—90	..	..
91,800	,,	,,	5	5	Wandsworth, Wimbledon, and Epsom—			
	,,	,,	6⅝	6½	Wandsworth A 5 p.c.	122—127	..	..
80,000					Do. B 3½ p.c.	102—107	..	..
356,686	,,	July 8	8¼	8¼	Do. C and New	88—93	..	..
412,460	,,	,,	7	7	Wimbledon 5 p.c.	98—103	..	..
869,000	,,	,,	5/19/0	5/19/0	Epsom 5 p.c.	104—109	..	101½
98,000	,,	,,	6⅝	6⅝	3 p.c. Deb.	55—58	+1	..
88,416	,,	June 24	7¼	7¼				
	,,	,,	3	3				

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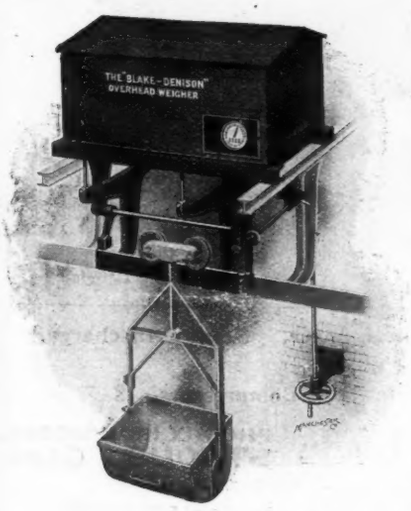

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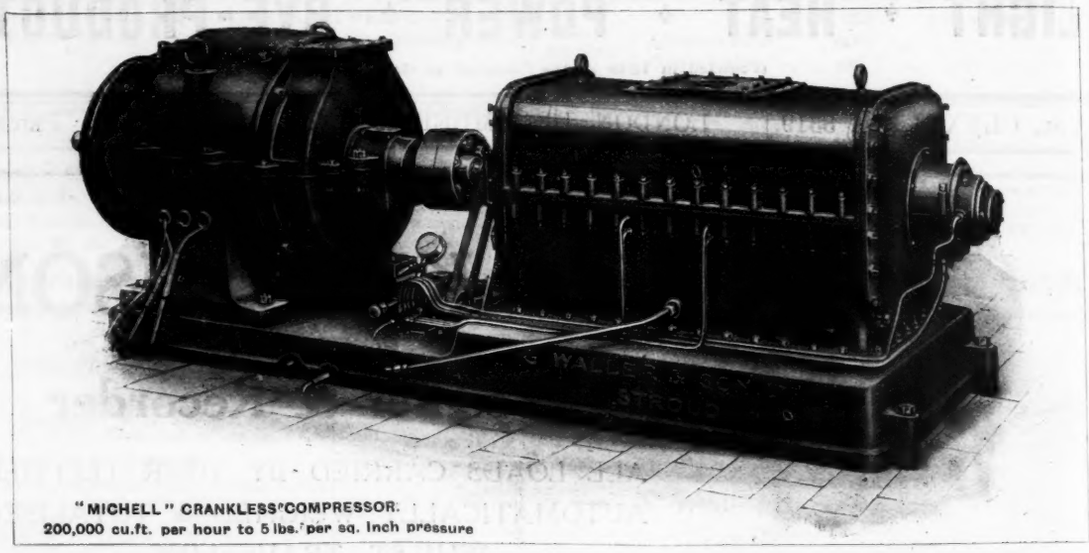

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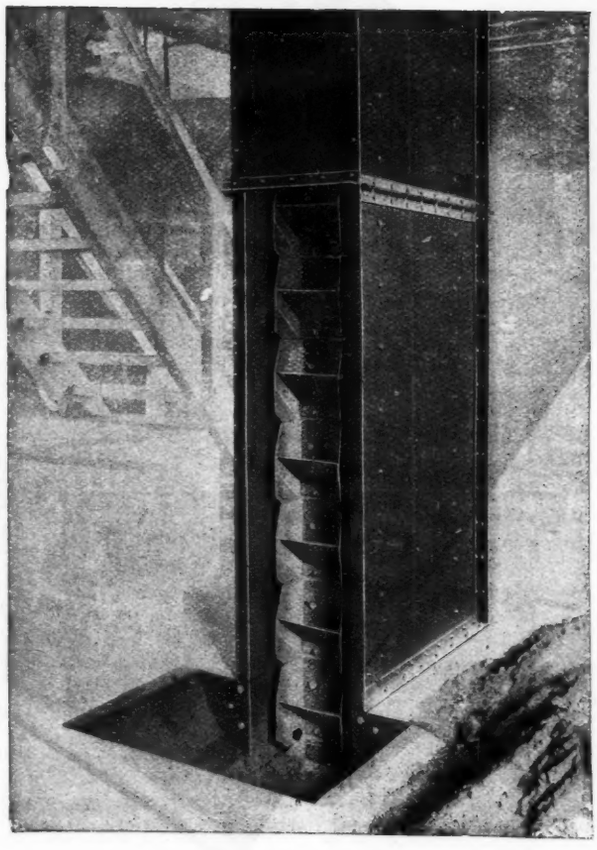

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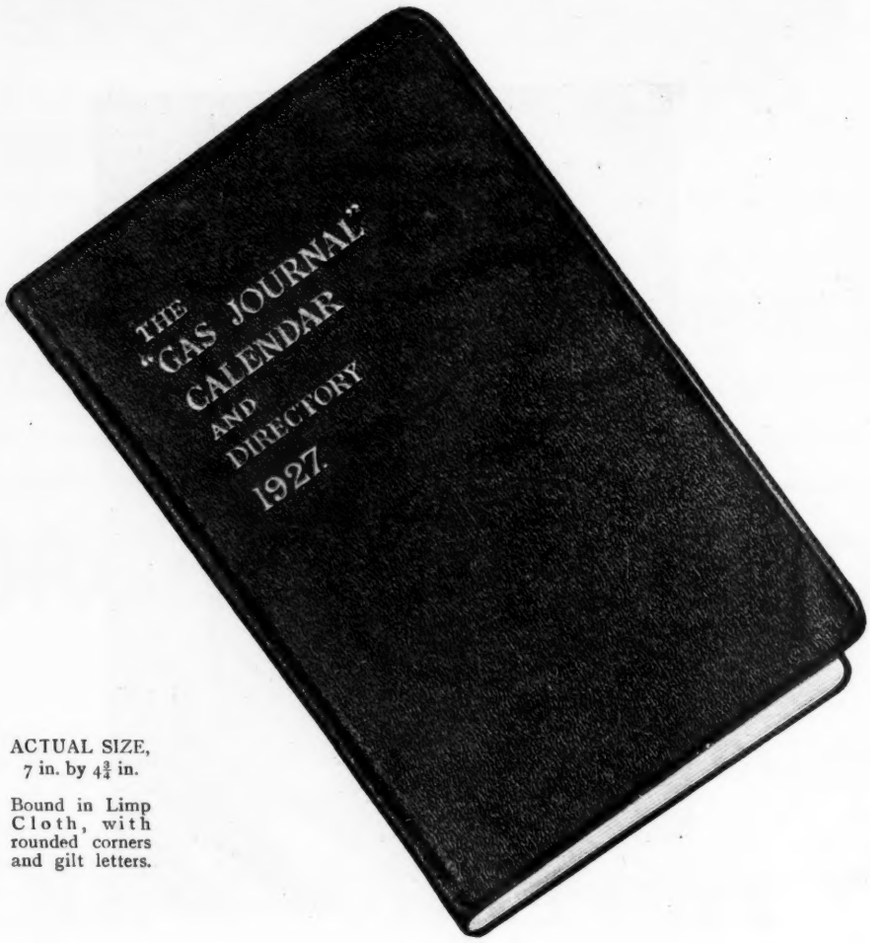

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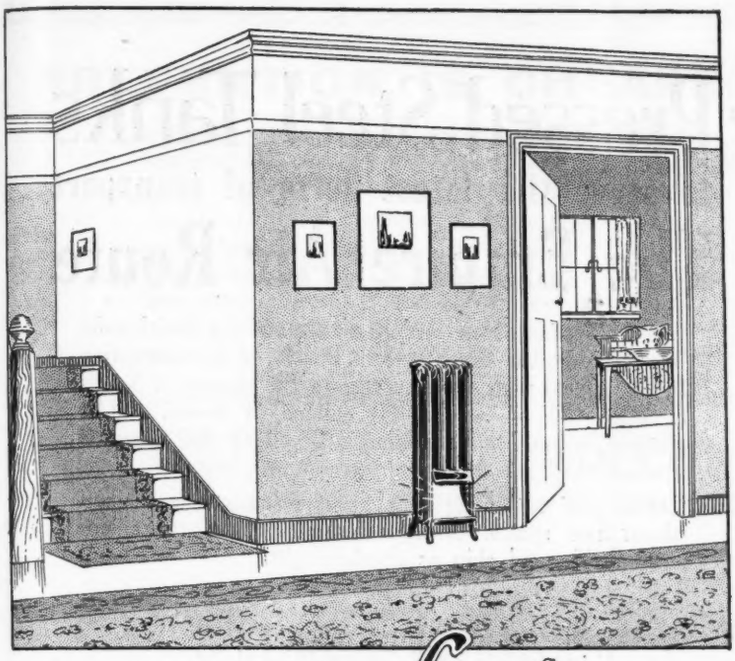

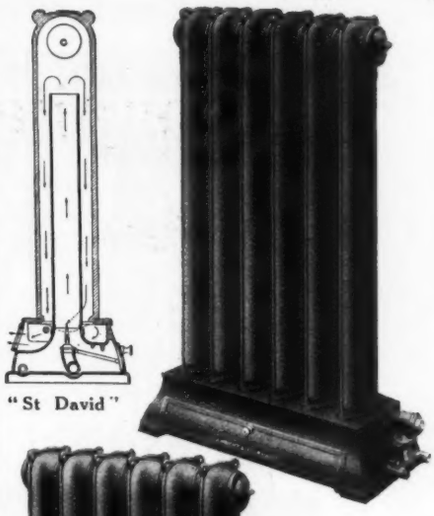

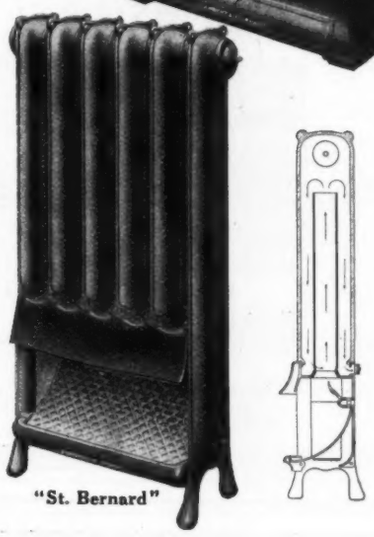

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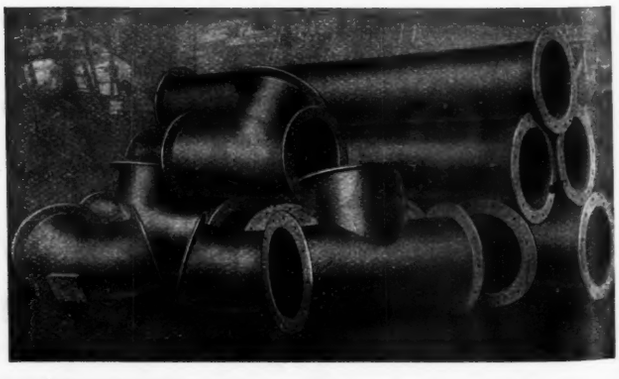

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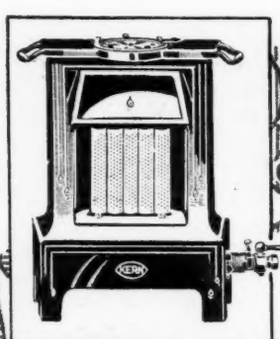

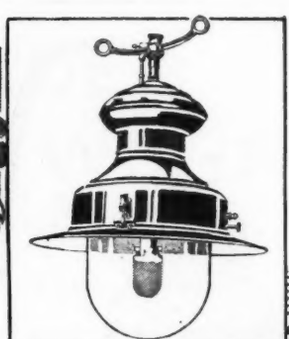

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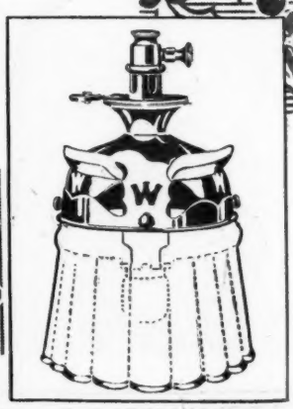

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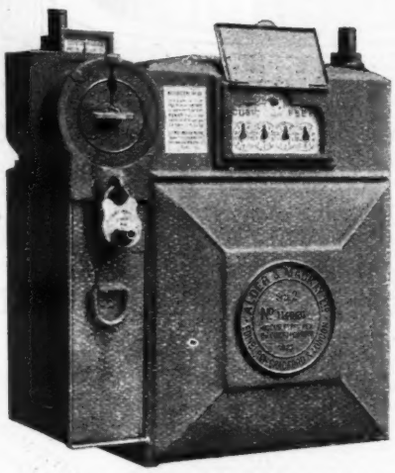

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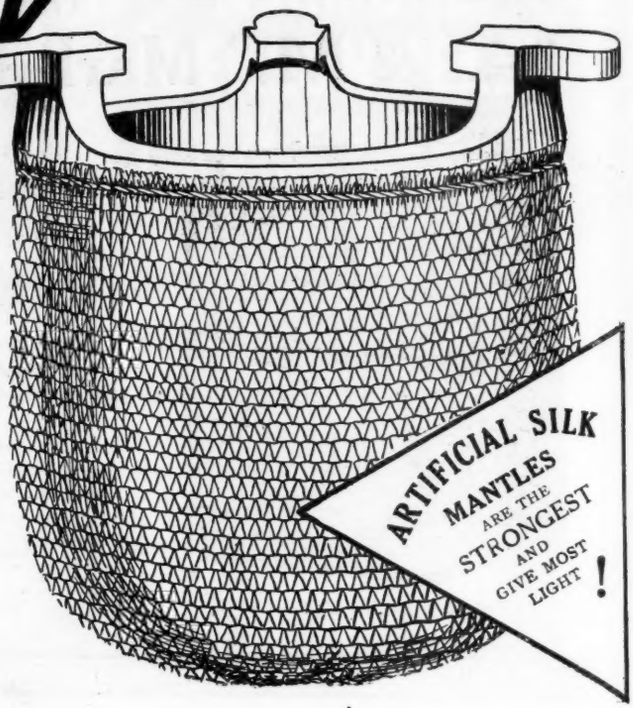

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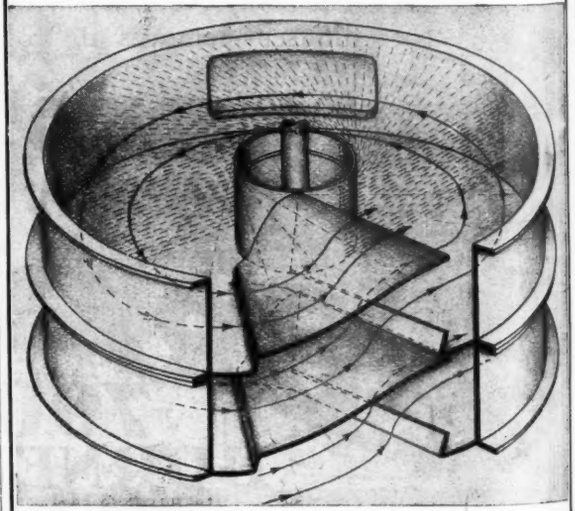

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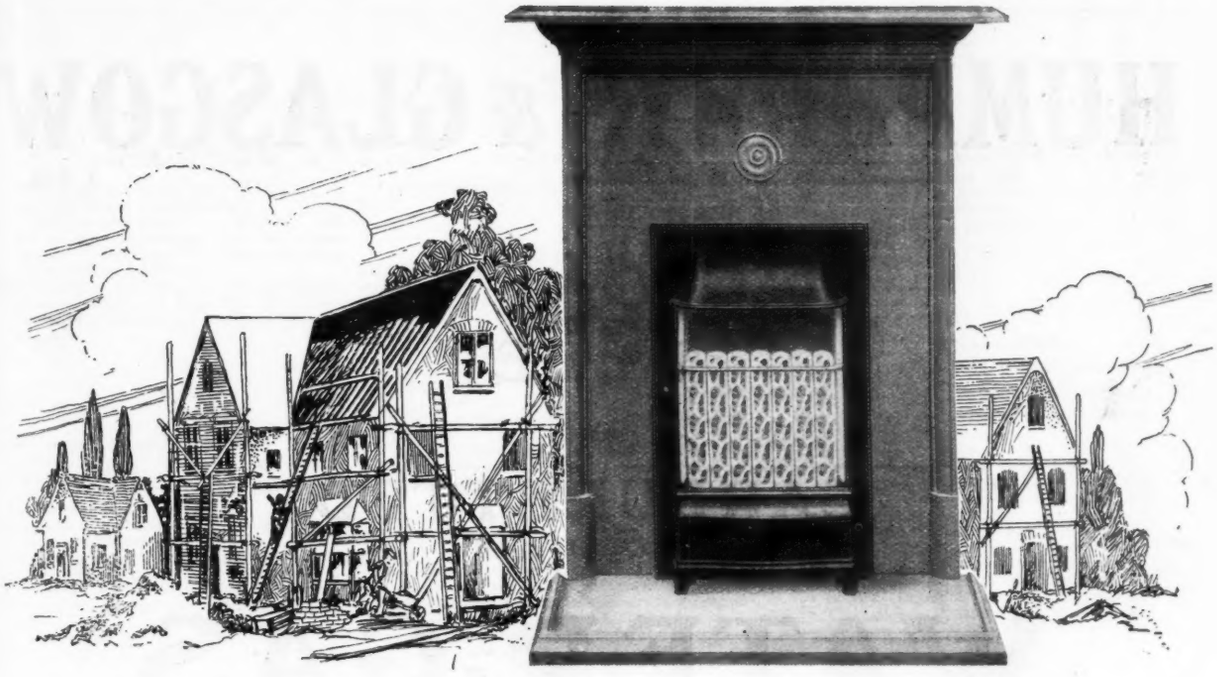

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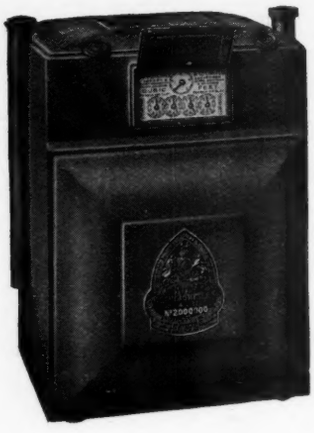

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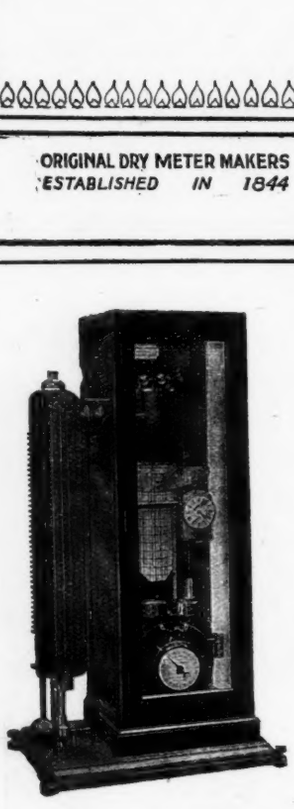

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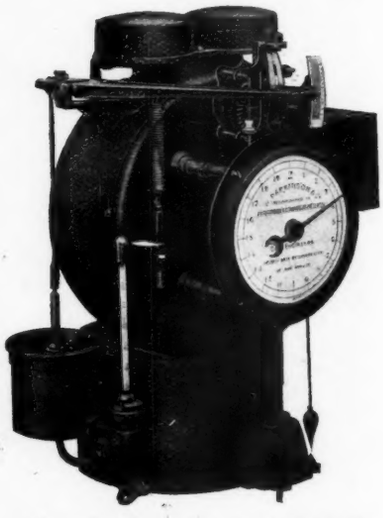

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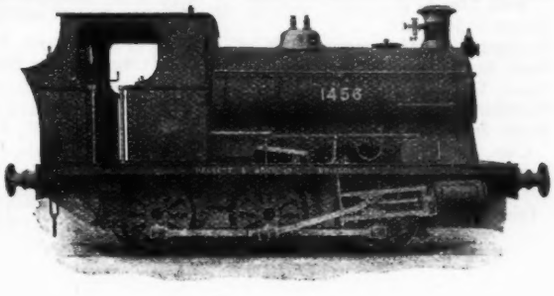

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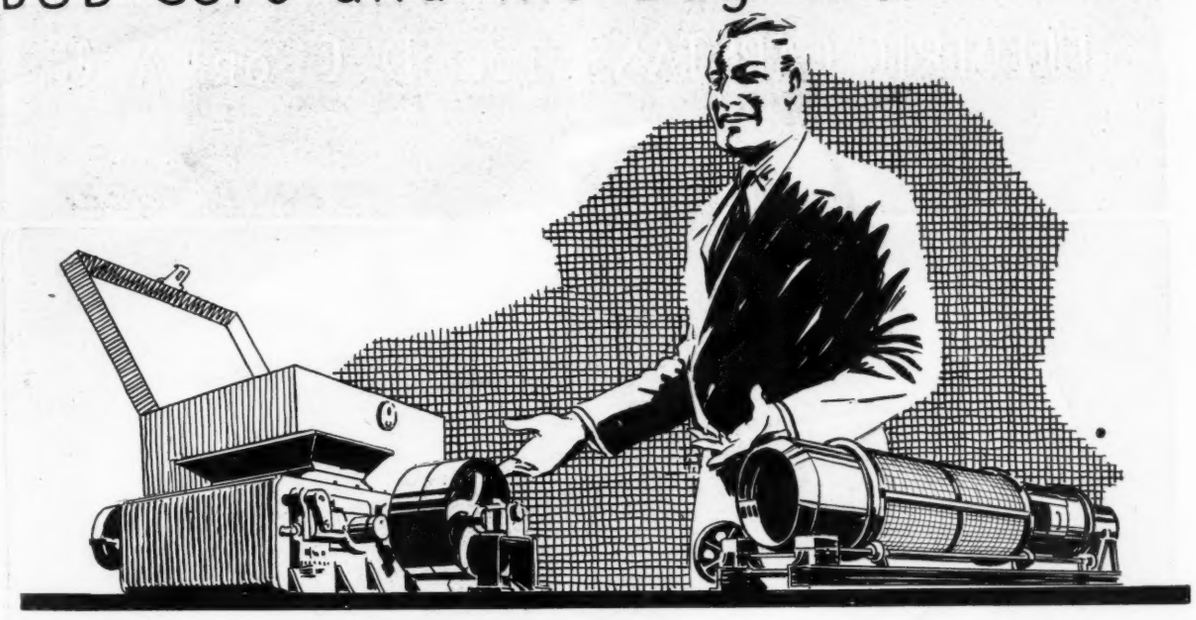

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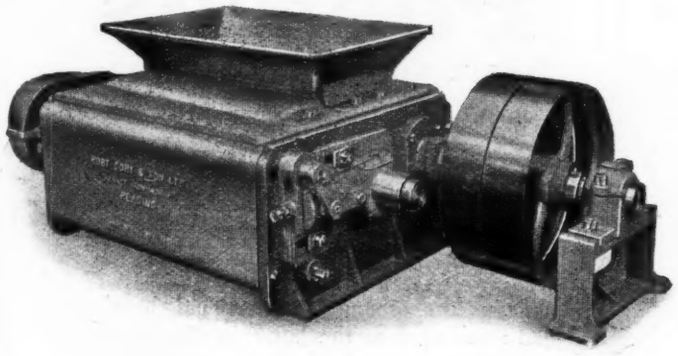

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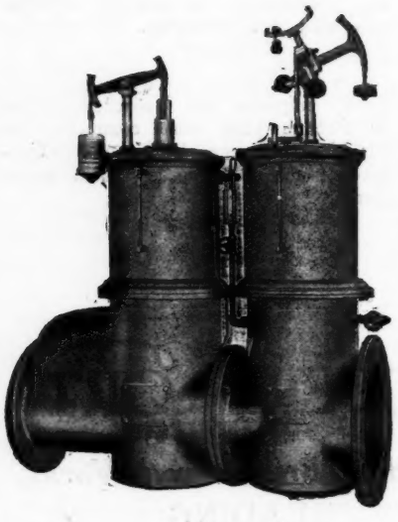

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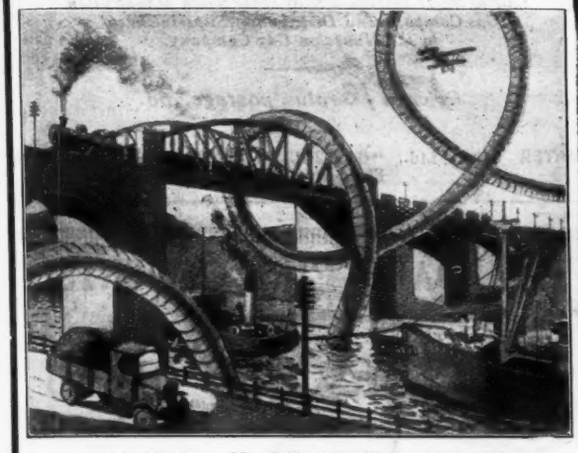

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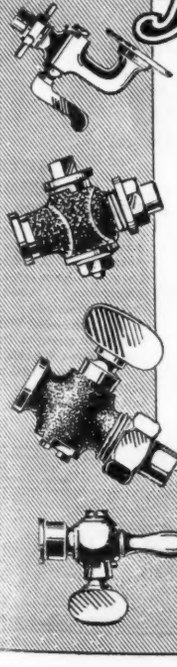

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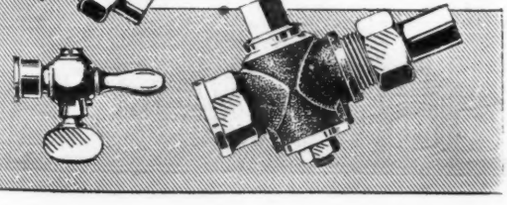

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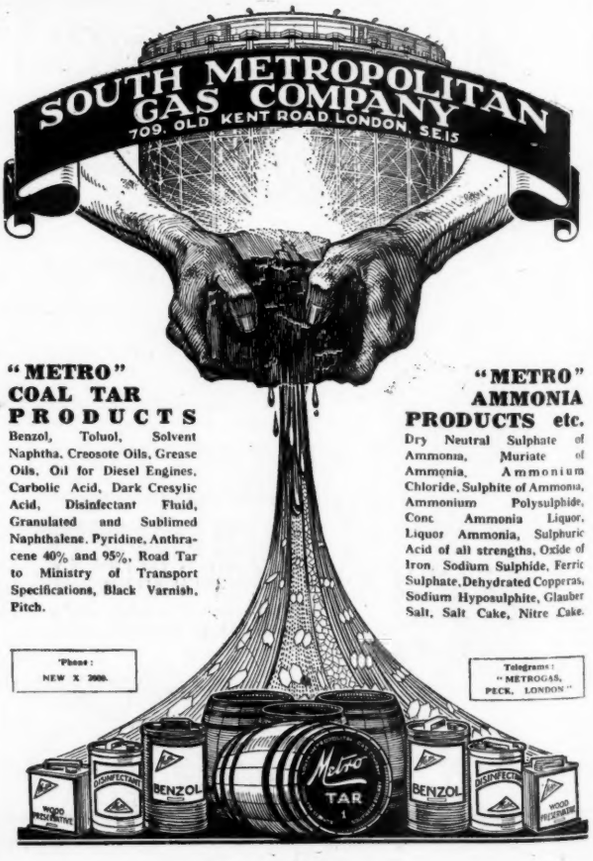
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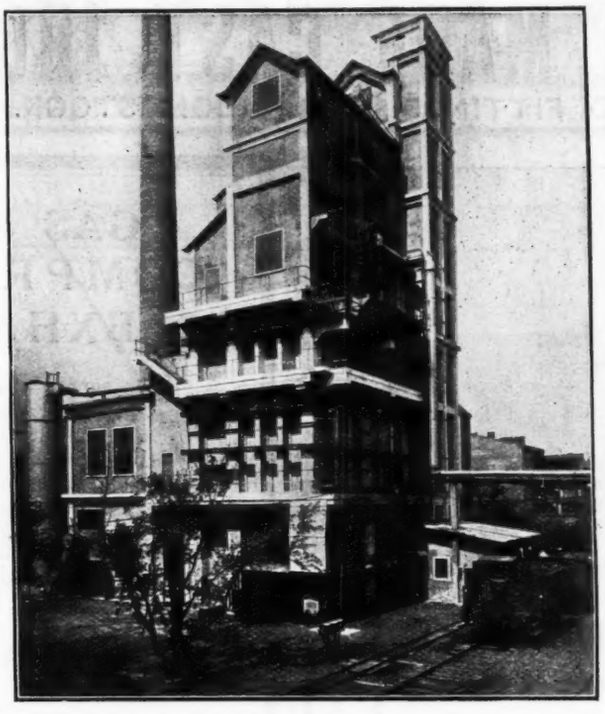

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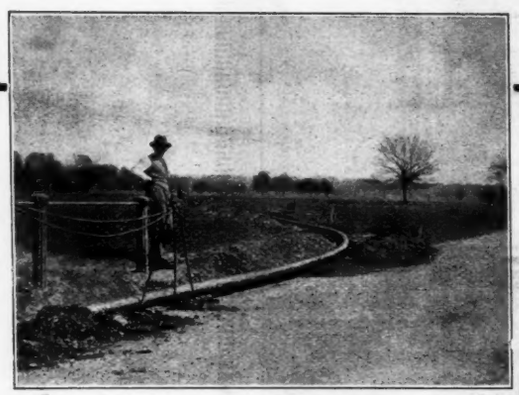

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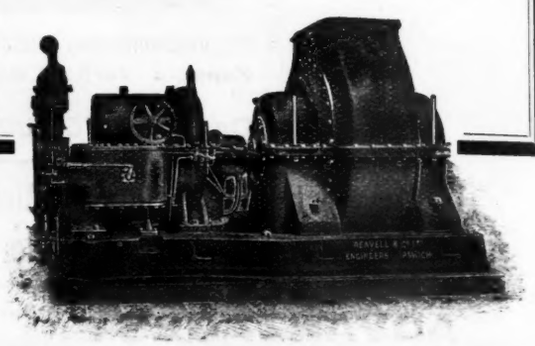

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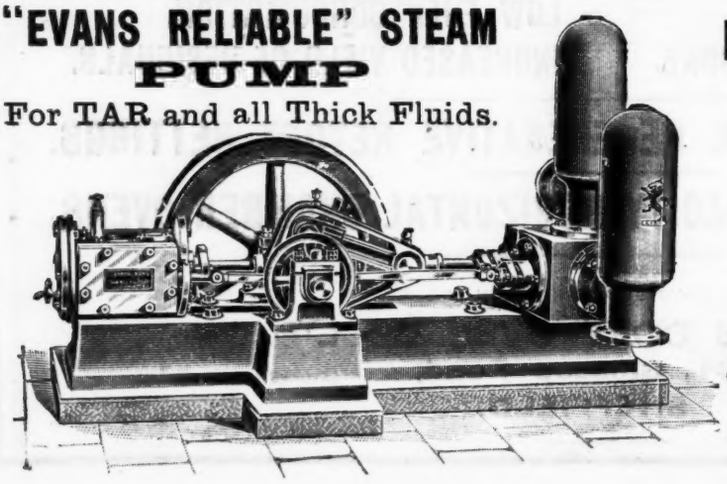

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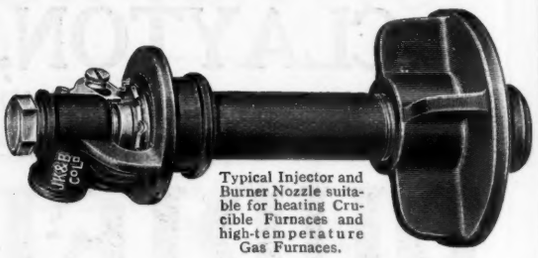

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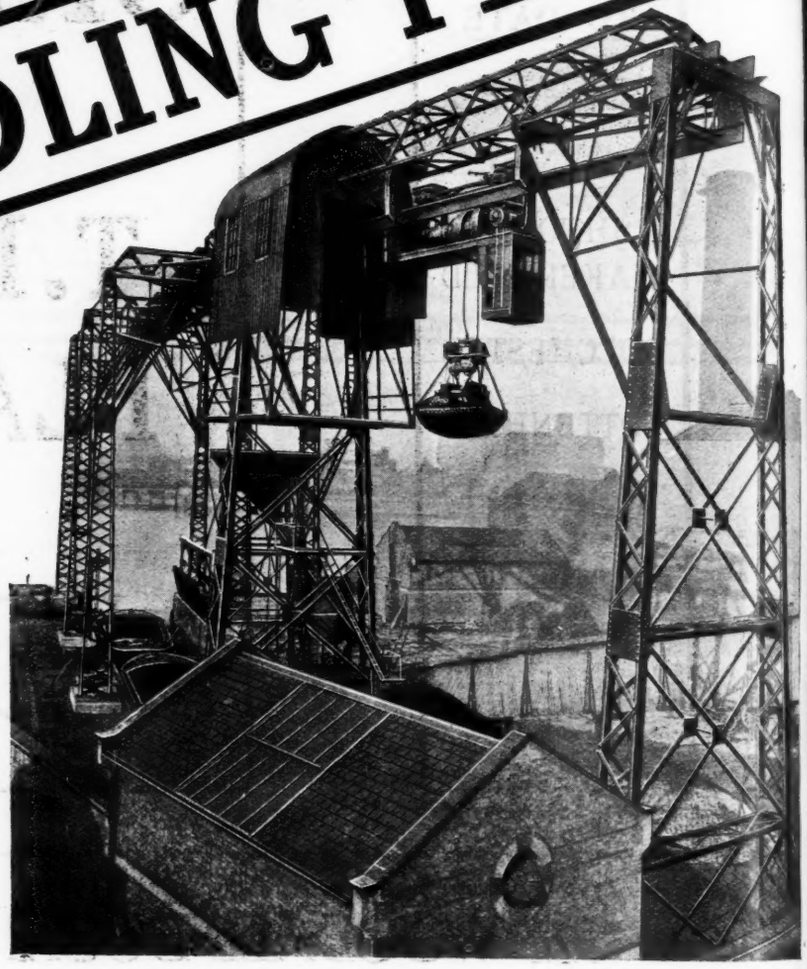

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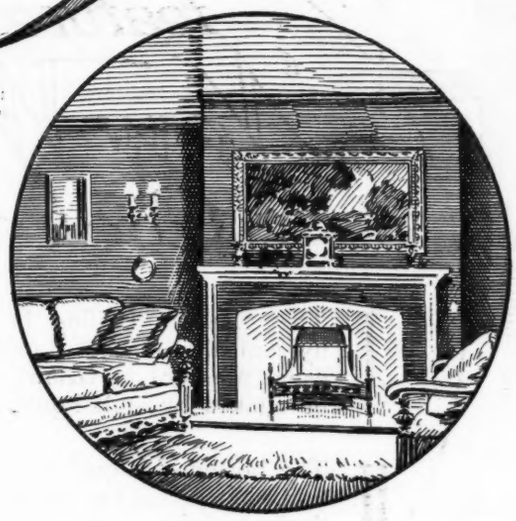

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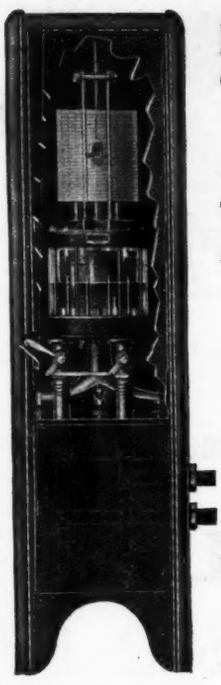

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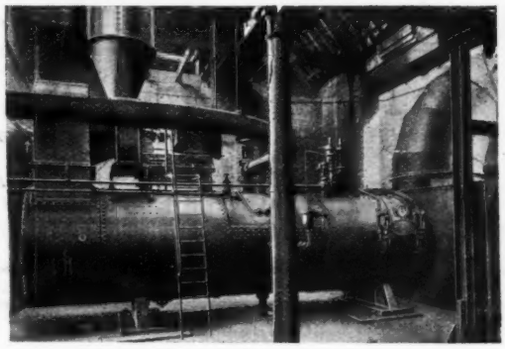

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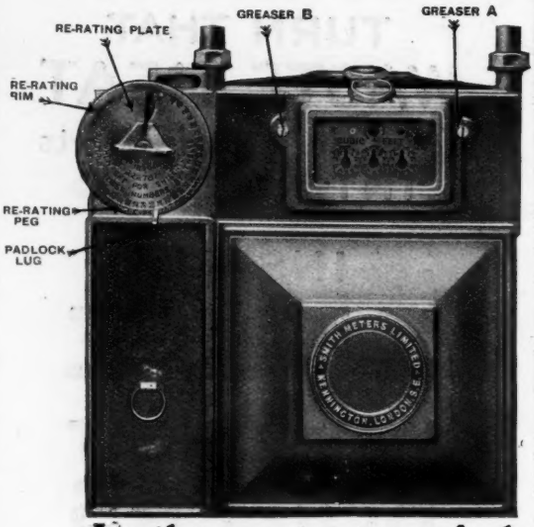

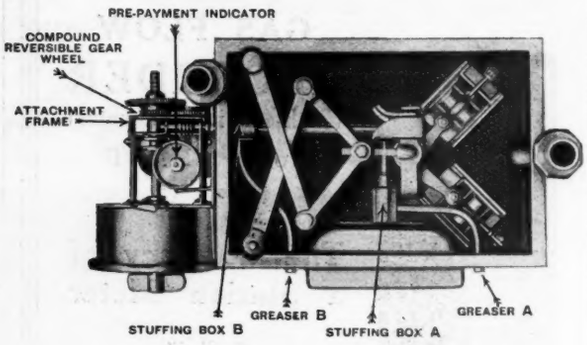

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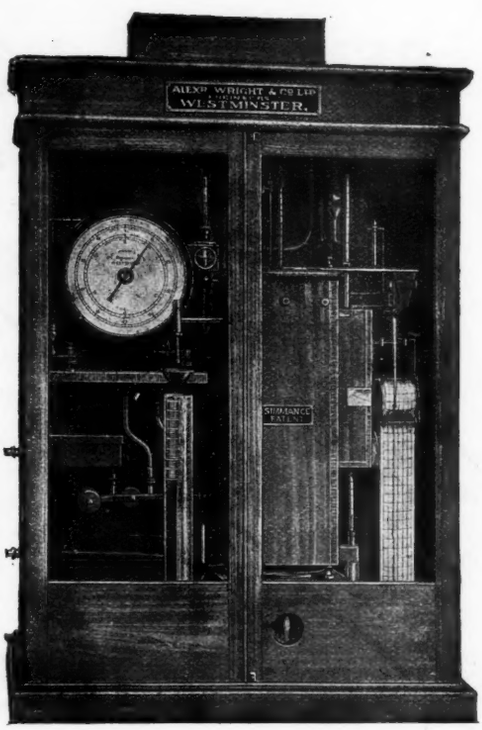

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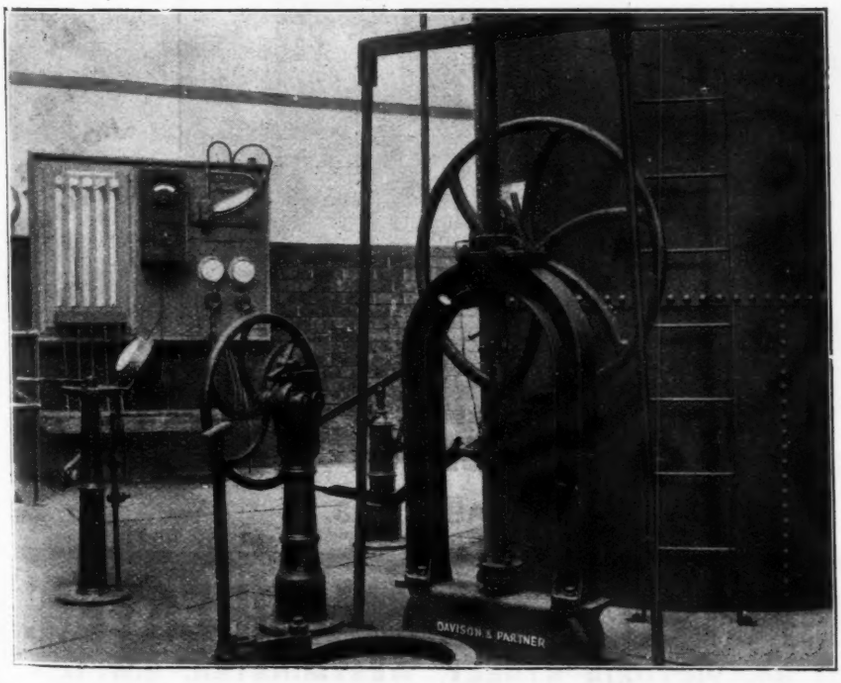

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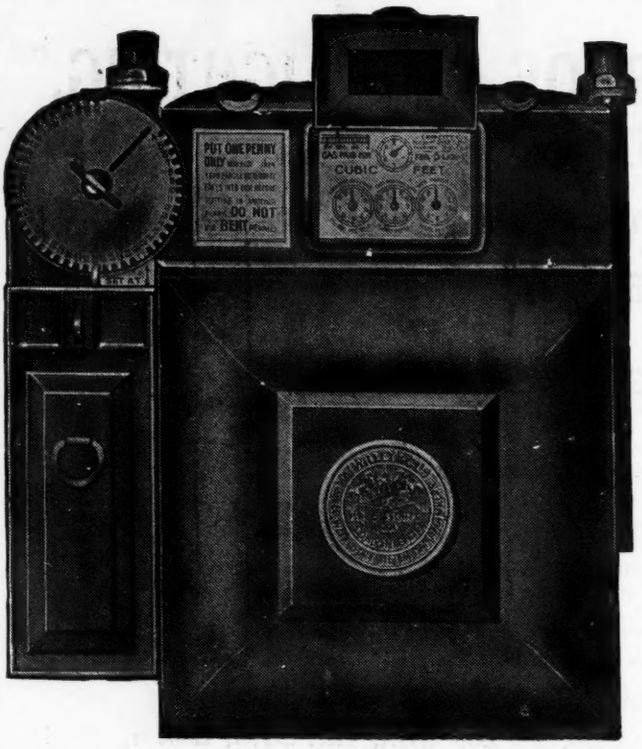

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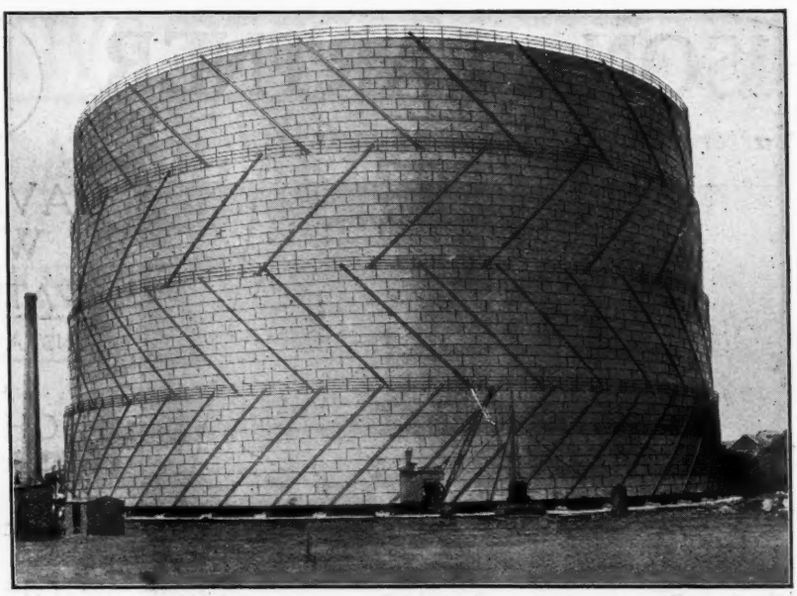

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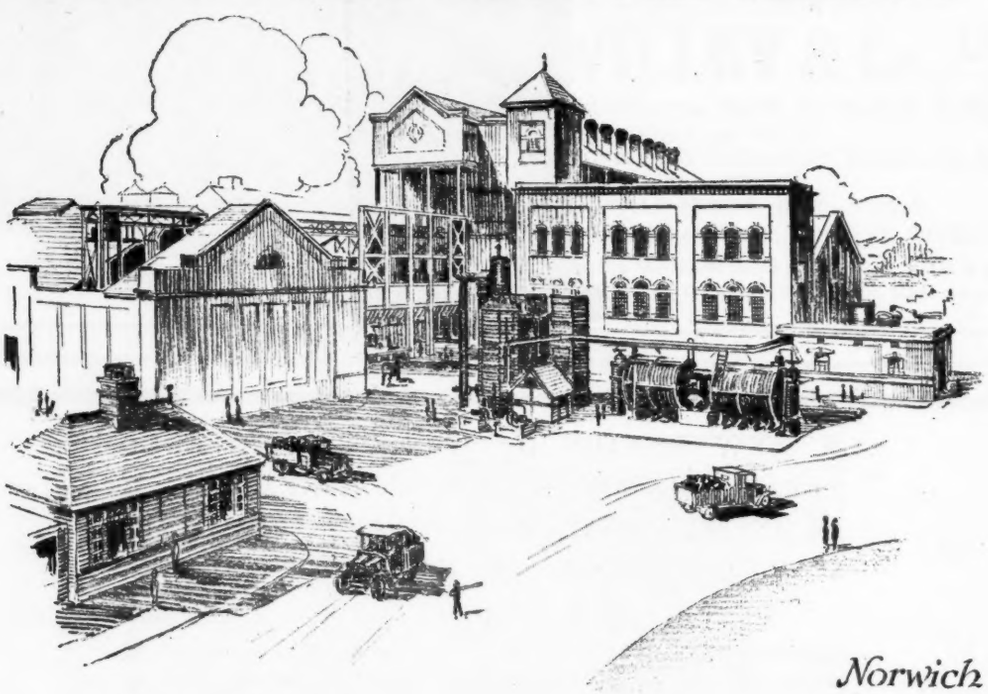

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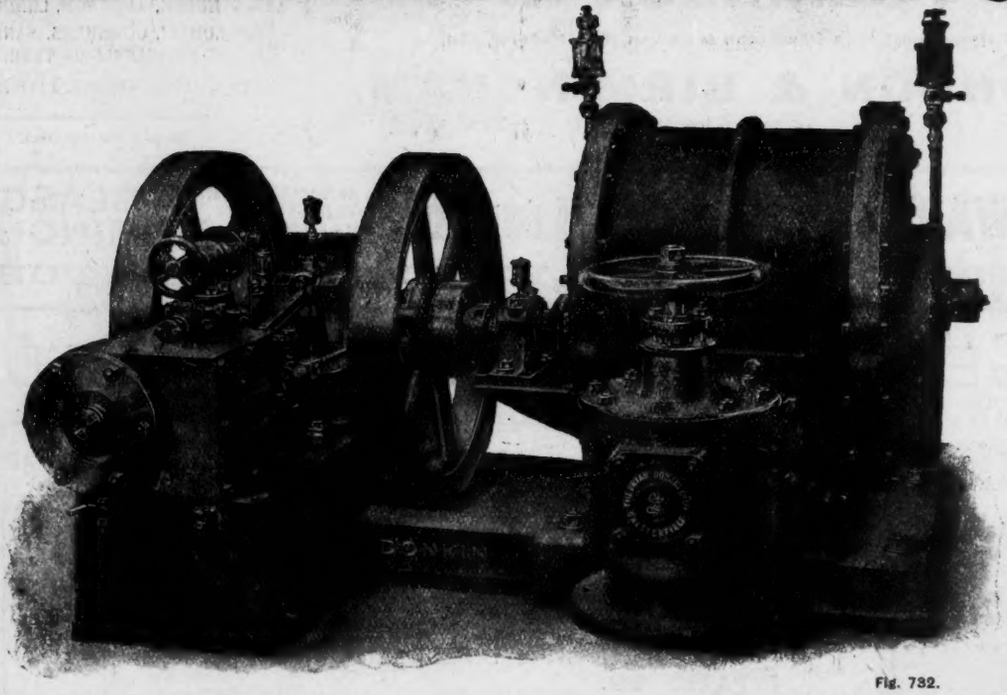

Fig. 732.

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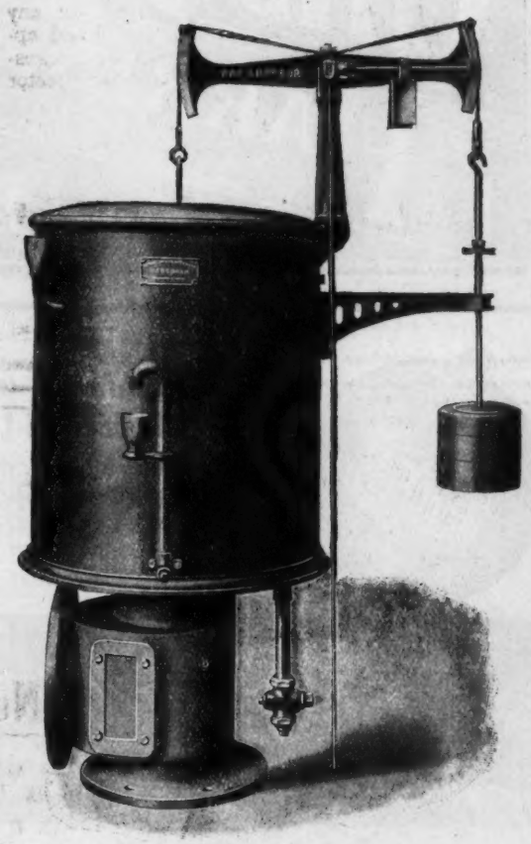

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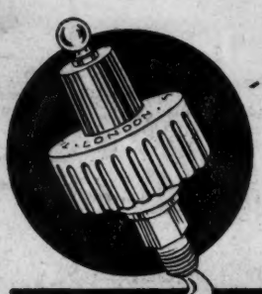

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